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LANG CREEK TIMBER SALE
ENVIRONMENTAL ASSESSMENT

Prepared by Pete Seigmund, Forester, Kalispell Unit, NWLO

October 2000

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DS-252

CHECKLIST ENVIRONMENTAL ASSESSMENT

Project Name: Lang Creek Timber Sale Proposed Implementation Date: February 2001

Proponent: Department of Natural Resources and Conservation, Trust Land Management Division, Northwestern Land Office, Kalispell-Plains Unit

Type and Purpose of Action: The Montana Department of Natural Resources and Conservation (DNRC), Kalispell-Plains Unit, proposes the Lang Creek Timber Sale. This proposed action would harvest approximately 3.0 million board feet(MMBF) of wood products. Approximately 1.4 miles of new road construction would be needed. The purpose of this project is to: 1) Produce revenue for the Public School Trust 2) Promote the development of historic stand conditions and to promote a biologically diverse and healthy forest. The project is located in section 16, T27N, R27W (Barnum Creek parcel) and in section 36, T27N, R27W (Lang Creek parcel) located approximately 30 air miles northwest of Kalispell, Montana. These parcels are located in Lincoln County. The 1280 acres within the project area are owned by the State of Montana and held in trust by DNRC. Timber sale activities would likely begin in the summer of 2001 and conclude in the year 2003. No other revenue generating opportunities were identified during the scoping and project development phases of this project. As a result, only the sale of forest products was analyzed in this EA.

Location: section 16 and 36, T27N, R27W County: Lincoln

I. PROJECT DEVELOPMENT

1. PUBLIC INVOLVEMENT, AGENCIES, GROUPS OR INDIVIDUALS CONTACTED: Provide a brief chronology of the scoping and ongoing involvement for this project.	Legal Notices were placed in the Sunday edition of the *Daily Interlake* on November 28, 1999 and December 5, 1999. Legal notices were also placed in the *Western News* for the weeks of November 22, 1999 and November 29, 1999. Scoping letters were sent on November 18, 1999 to adjacent landowners. Interested parties and those groups and individuals on the Northwestern Land Office Kalispell-Plains mailing list were sent letters soliciting input in October of 1999. Those involved from the Department of Natural Resources and Conservation include: Jay Shepard, Wildlife Biologist; Tony Nelson, Soil and Hydrology Specialist; Patrick Rennie, Archaeologist; Gary Hadlock, Logging Systems and Road Engineer; Beverly O'Brien, Kalispell Office Forest Management Supervisor; Mike Conner, Right-of-way Specialist. Comments and concerns were addressed and incorporated until the completion of the final EA.
2. OTHER GOVERNMENTAL AGENCIES WITH JURISDICTION, LIST OF PERMITS NEEDED:	No other governmental agencies have jurisdiction. A road use permit will be required for access into the Lang Creek parcel. A 124 permit (Stream Preservation Act Permit) is needed for bridge installation and removal and for culvert installation and removal.
3. ALTERNATIVES CONSIDERED:	Two alternatives were developed for this project, a 'no-action alternative' and a 'action alternative' which are described as follows: 1) No Action Alternative - This alternative provides the baseline for comparing the environmental consequences of the action alternative. Under this alternative, no timber would be harvested resulting in no revenue for the School Trust. Existing land uses such as road use and recreation would continue to occur. Approximately 500 acres of mixed conifer and Douglas-fir stands would continue to develop in appropriate western larch/Douglas-fir stand types. Historic stand conditions would not be promoted.

	2) Action Alternative - Approximately 730 acres would be harvested using commercial thinning, seed tree and shelterwood harvest. Expected harvest volume would be about 3.0 MMBF. Silvicultural prescriptions would promote the conversion of approximately 500 acres of current mixed conifer, Douglas-fir and sub-alpine types to appropriate western larch/Douglas-fir types. Historic stand conditions would be promoted as well as improve forest health and stand vigor. Approximately 23.2 miles of existing roads would be used to access the project area. 15.6 miles of existing roads will be upgraded and re-constructed to meet Best Management Practices (BMP's) and 7.6 miles of existing roads will be maintained and BMP's improved. 8.7 miles of existing roads will be closed and an existing sediment source on a perennial stream that flows into Lang Creek would be repaired and rehabilitated.

II. IMPACTS ON THE PHYSICAL ENVIRONMENT

RESOURCE	[Y/N] POTENTIAL IMPACTS AND MITIGATION MEASURES N = Not present or No Impact will occur. Y = Impacts may occur (explain below)
4. GEOLOGY AND SOIL QUALITY, STABILITY AND MOISTURE: Are fragile, compactible or unstable soils present? Are there unusual geologic features? Are there special reclamation considerations? Are cumulative impacts likely to occur as a result of this proposed action?	[Y] All specialist recommendations and mitigations as well as Best Management Practices (BMP's) will be implemented to protect soil resources. Logging operations will occur only on dry, frozen, or snow covered conditions. Equipment operations will be limited on slopes in excess of 45%. Woody debris and green slash will be retained to provide for long term site productivity. No uniquely fragile or sensitive soils are present within the units. Streamside Management Zones (SMZ's) and adjacent wet areas will be outside the harvest unit boundaries. Refer to Attachment B:2 for watershed and soil existing conditions and direct, indirect and cumulative environmental effects. Refer to Attachment C: Mitigations To Be Implemented for a summary of all mitigations to be implemented. No unique or unstable geology was observed within the project area.
5. WATER QUALITY, QUANTITY AND DISTRIBUTION: Are important surface or groundwater resources present? Is there potential for violation of ambient water quality standards, drinking water maximum contaminant levels, or degradation of water quality? Are cumulative impacts likely to occur as a result of this proposed action?	[Y] Section 16: Two perennial streams are located in this section. No harvest activity will take place within 200 feet of the stream located in the northern half of this parcel. No project activity is to take place within SMZ's or adjacent wet areas. Section 36: Lang Creek flows through the length of this parcel. Two perennial tributaries flow into Lang Creek from the east. Several streams that have perennial but discontinuous flow are located to the west of Lang Creek. These steams do not contribute surface flow to Lang Creek or any other stream. No harvest activity will take place within SMZ's along perennial streams or adjacent wet areas. An existing sediment source on a perennial tributary of Lang Creek will be repaired. Implementation of BMP's and project mitigations will protect water resources. Refer to Attachment B:2 for watershed and soil existing conditions and direct, indirect, and cumulative environmental effects. Refer to Attachment

	C: Mitigations To Be Implemented for a summary of all mitigations to be implemented.A current grazing lease covers the entire project area. In the past several years, minimal grazing activity has occurred within the project area. Effects of grazing on native vegetation and riparian areas will be evaluated at the time of lease renewal.
6. AIR QUALITY: Will pollutants or particulate be produced? Is the project influenced by air quality regulations or zones (Class I airshed)? Are cumulative impacts likely to occur as a result of this proposed action?	[Y] The project area is located within Airshed 1. State Hazard Reduction Standards and necessary site preparation will be met by burning landing piles and slash concentrations within harvest units. All burning will be under the coordination of the Montana Cooperative Airshed Group and will comply with all State air quality standards. Dust may be created from log hauling on graveled portions of roads during summer and fall months.
7. VEGETATION COVER, QUANTITY AND QUALITY: Will vegetative communities be permanently altered? Are any rare plants or cover types present? Are cumulative impacts likely to occur as a result of this proposed action?	[N] The project area is surrounded by small private, industrial forestland. The surrounding area has a history of past and ongoing timber harvest activity. Vegetative communities that occur within the project area will be present after the completion of the project. Spatial distribution and compositional characteristics of these communities would be changed. Silvicultural prescriptions will promote historic stand types by conversion of mixed conifer and Douglas-fir stands to western larch/Douglas-fir stands. Stands that are currently typed as western larch/Douglas-fir old growth per criteria in the State Forest Land Management Plan will be deferred. Treatment of old growth stands is consistent with guidance in the SFLMP and current literature and research. Refer to Attachment B:1 Vegetation for a complete description of stand history, existing stand conditions, prescribed treatments, direct, indirect, and cumulative effects. Refer to Attachment C: Mitigations To Be Implemented for a summary of all mitigations to be implemented. Rare plants or cover types listed by the Montana Natural Heritage program have not been found within the project area. An Integrated Weed Management Approach (IWM) will be implemented to limit the potential for the spread and introduction of noxious weeds into the project area. Refer to Attachment C: Mitigations To Be Implemented for a summary of all mitigations to be implemented.
RESOURCE	[Y/N] POTENTIAL IMPACTS AND MITIGATION MEASURES
8. TERRESTRIAL, AVIAN AND AQUATIC LIFE AND HABITATS: Is there substantial use of the area by important wildlife, birds or fish? Are cumulative impacts likely to occur as a result of this proposed action?	[Y] The project area provides habitat for a wide variety of wildlife. Field reconnaissance indicated moderate to high use by white-tailed deer, moose, snowshoe hares, and cavity dependent bird species. Signs of moderate use by black bears are present. A portion of the Lang Creek parcel is mapped as white tailed deer winter range. Lang Creek, several perennial streams, and several large wet meadows are present in this parcel. No harvest activity will occur within SMZ's of perenial streams and adjacent wet areas. Decrease in open road densities and emulation of historic stand conditions will provide beneficial effects to wildlife. Refer to Attachment B:3 wildlife for existing conditions and direct, indirect, and cumulative effects. Refer to Attachment C: Mitigations To Be Implemented for a summary of all mitigations to be implemented.

9. UNIQUE, ENDANGERED, FRAGILE OR LIMITED ENVIRONMENTAL RESOURCES: Are any federally listed threatened or endangered species or identified habitat present? Any wetlands? Sensitive Species or Species of special concern? Are cumulative impacts likely to occur as a result of this proposed action?	[Y] Several wet meadows and adjacent Streamside Management Zones (SMZ's) are located in the center of the Lang Creek parcel. No activity will occur within these wet areas or SMZ's. No federally listed threatened or endangered species or suitable habitats were found within the sale area. Moderate to high use of the project area by pileated woodpeckers was noted. Decreasing open road densities and promoting the development of larger diameter seral species will provide beneficial effects to pileateds. Refer to Attachment B:3 wildlife for existing conditions and direct, indirect, and cumulative effects to pileated woodpeckers. Refer to Attachment C: Mitigations To Be Implemented for a summary of all mitigations to be implemented.
10. HISTORICAL AND ARCHAEOLOGICAL SITES: Are any historical, archaeological or paleontological resources present?	[N] An archaeological review of the project area was done by the Department of Natural Resources and Conservation archaeologist. No historical or archaeological resources were found.
11. AESTHETICS: Is the project on a prominent topographic feature? Will it be visible from populated or scenic areas? Will there be excessive noise or light? Are cumulative impacts likely to occur as a result of this proposed action?	[N] The project is surrounded by private, industrial timberland and approximately 2 air miles away from the nearest residence. The project area is not visible to the general public. Prescribed treatments will not dramatically change the appearance of the area. Excessive noise or light will not result from project implementation.
12. DEMANDS ON ENVIRONMENTAL RESOURCES OF LAND, WATER, AIR, OR ENERGY: Will the project use resources that are limited in the area? Are there other activities nearby that will affect the project? Are cumulative impacts likely to occur as a result of this proposed action?	[N]
13. OTHER ENVIRONMENTAL DOCUMENTS PERTINENT TO THE AREA: Are there other studies, plans or projects on this tract? Are cumulative impacts likely to occur as a result of other private, state or federal current actions w/n the analysis area, or from future proposed state actions that are under MEPA review (scoping) or permitting review by any state agency w/n the analysis area?	[Y] Two Environmental Assessments (EA) were recently completed for the Barnum Creek parcel. One was completed in November 1997 for a reciprocal assess agreement with Plum Creek Timber, CO. A second EA was completed in October 1998 for a pre-commercial thinning on approximately 177 acres.

III. IMPACTS ON THE HUMAN POPULATION

RESOURCE	[Y/N] POTENTIAL IMPACTS AND MITIGATION MEASURES
14. HUMAN HEALTH AND SAFETY: Will this project add to health and safety risks in the area?	[N]
15. INDUSTRIAL, COMMERCIAL AND AGRICULTURAL ACTIVITIES AND PRODUCTION: Will the project add to or alter these activities?	[N]
16. QUANTITY AND DISTRIBUTION OF EMPLOYMENT: Will the project create, move or eliminate jobs? If so estimated number. Are cumulative impacts likely to occur as a result of this proposed action?	[N] People are currently employed in the wood products industry in the region. Due to the relatively small size of the timber sale program on the Kalispell Office, there will be no measurable cumulative impact from this proposed action on employment.
17. LOCAL AND STATE TAX BASE AND TAX REVENUES: Will the project create or eliminate tax revenue? Are cumulative impacts likely to	[N] People are currently paying taxes from the wood products industry in the region. Due to the relatively small size of the timber sale program of

III. IMPACTS ON THE HUMAN POPULATION

occur as a result of this proposed action?	the Kalispell Office, there will be no measurable cumulative impact from this proposed action on tax revenues.
18. DEMAND FOR GOVERNMENT SERVICES: Will substantial traffic be added to existing roads? Will other services (fire protection, police, schools, etc) be needed? Are cumulative impacts likely to occur as a result of this proposed action?	[N] There will be no measurable cumulative impacts related to demand for government services due to the relatively small size of the timber sale program, the short-term impacts to traffic, the small possibility of a few people temporarily relocating to the area, and the lack of other timber sales in the adjacent area.
19. LOCALLY ADOPTED ENVIRONMENTAL PLANS AND GOALS: Are there State, County, City, USFS, BLM, Tribal, etc. zoning or management plans in effect?	[Y] In June 1996, DNRC began a phased-in implementation of the State Forest Land Management Plan (Plan). The management direction provided in the Plan comprises the framework within which specific project planning and activities take place. The Plan philosophy and appropriate Resource Management Standards have been incorporated into the design of the proposed action.
20. ACCESS TO AND QUALITY OF RECREATIONAL AND WILDERNESS ACTIVITIES: Are wilderness or recreational areas nearby or accessed through this tract? Is there recreational potential within the tract? Are cumulative impacts likely to occur as a result of this proposed action?	[Y] Section 36: The Meadow Peak Road that accesses the Meadow Peak Lookout goes through this parcel. The Forest Service controls the access on this road. Dispersed recreational activities such as hunting, horseback riding, and ATV use occur. This project would not have any cumulative impacts on these activities. Section 16: The project area is accessed by private roads that do not provide for public access. Dispersed recreation activities such as hunting occur. Given access restrictions to the project area, it is not feasible for significant amounts of recreation to take place.
21. DENSITY AND DISTRIBUTION OF POPULATION AND HOUSING: Will the project add to the population and require additional housing? Are cumulative impacts likely to occur as a result of this proposed action?	[N] There will be no measurable cumulative impacts related to population and housing due to relatively small size of the timber sale program, and the fact that people are already employed in this occupation in the region.
22. SOCIAL STRUCTURES AND MORES: Is some disruption of native or traditional lifestyles or communities possible?	[N]
23. CULTURAL UNIQUENESS AND DIVERSITY: Will the action cause a shift in some unique quality of the area?	[N]
24. OTHER APPROPRIATE SOCIAL AND ECONOMIC CIRCUMSTANCES: Is there a potential for other future uses for easement area other than for timber management? Is future use hypothetical? What is the estimated return to the trust. Are cumulative impacts likely to occur as a result of this proposed action?	[N] At this time, there is no potential for other uses of the project area. The following assumptions were made for estimating return to the trust: 1. The estimated harvest volume is 3,000 MBF. 2. The estimated stumpage value is $125.00 per MBF. - The estimated stumpage value equals the delivered log prices minus costs and an amount for profit and risk. Costs include logging costs, haul costs, forest improvement fees, development costs, and other costs (e.g. Road maintenance). Profit and risk is the return to timber buyer that accounts for actual time and effort, some profit for entrepreneurial spirit, and something to cover the expected losses on an occasional sale that is not profitable. - Estimated return to the trust = 3,000 X $125.00 = $375,000 - Estimated return to the trust was calculated as follows: Costs, revenues, and estimates of

III. IMPACTS ON THE HUMAN POPULATION

	return are estimates intended for relative comparison of alternatives. They are not intended to be used as absolute estimates of return.

EA Checklist Prepared By: Pete Seigmund (Name) Management Forester (Title) 10/28/2000 (Date)

IV. FINDING

25. ALTERNATIVE SELECTED:

The action alternative to harvest timber from 730 acres within the Lang Creek and Barnum Creek parcels is selected for implementation. It is understood that implementation of the action alternative includes the associated mitigation measures identified in Attachment C.

The action alternative meets the objective of generating revenue from trust lands and aids in meeting the state law requirement, to annually offer for sell 42 MMBF of timber. The timber sale has been designed to minimize or avoid impacts to the environment, protecting the long- term productivity of the land in accordance with applicable federal and state laws, and the DNRC State Forest Land Management Plan.

26. SIGNIFICANCE OF POTENTIAL IMPACTS:

For the following reasons, I find that the Action Alternative with implementation of mitigation measures discussed in Attachment C part I, will not have significant impacts on the human environment:

A. SOILS

Measures to be used in this project to limit soil compaction, displacement, and erosion, such as: skyline yarding on steep slopes; skidding when soil is dry, frozen, or snow covered; using existing roads and skid trails where possible; trail spacing; and leaving slash on site, are all commonly used methods that have effectively protected the soil resource during logging operations.

B. WATER QUALITY

Harvesting 280 acres in the Barnum Creek watershed and harvesting 449 acres and constructing 1.4 miles of road in the Lang Creek watershed would not increase the water yield above the identified "allowable water yield increase" threshold s for either drainage (pg 9, attachment B:2). Although the water yield increase approaches the threshold of 14.5% for the Barnum Creek drainage, harvesting levels do not appear to be affecting channel stability (pg 5, Attachment B: 2). Threshold values were based on: channel stability, channel sensitivity to disturbance, acceptable risk level, and the resource value at stake (pg 5, Attachment B: 2). Understanding that the water yield threshold value for Barnum Creek is within an acceptable risk limit; that much of the adjacent forest lands are in a growing, reforesting condition; and no harvest will occur within SMZ's keeping all vegetation within 50 feet or more of the streams intact; a significant increase in erosion would not occur as a result of the increased water yield in Barnum Creek. Furthermore, stipulations and permit requirements to mitigate water quality impacts would be implemented by DNRC for relevant project activities. The Streamside Management Zone law requirements will be exceeded as no harvest is planned within located SMZs. Road improvements planned for existing roads would eventually reduce the amount of sediment production from roads as surface drainage is added, one stream crossing improved, (pg 2 EA) and approximately 8.5 miles of existing roads are closed to daily use (pg 7 Attachment B:3).

C. FISHERIES

According to MRIS westslope cutthroat trout spawning and rearing occurs in both Barnum and Lang Creek. Although short-term sedimentation will occur during the repair of the bridge site on Lang Creek the long-term effect would be reduced risk of unacceptable amounts of sediment entering Lang Creek as a result of failure at this site. By performing the repair of this site during low water periods and using filter fabric and stabilizing banks the amount of sediment entering Lang Creek will be controlled and limited. This project also defers all areas within SMZs from harvest as required in SFLMP resource management standard # 2 under Fisheries.

D. TIMBER/SUSTAINABILITY

The 1240 acres of state land is approximately 10% of the associated watersheds for the project. The 729 acres to be harvested is 61% of the

state land. Silvicultural treatments will contribute towards attaining more desirable future conditions for the Kalispell Landscape. Cover type distribution on the Kalispell Landscape currently has a large excess of acres in the mixed conifer cover type and a large deficit in the WL/DF cover type. The silvicultural treatments will convert 500 acres of MC or DF cover type to the appropriate WL/DF cover type. Treatment will involve 225 acres (three stands) that meet the SFLMP's working definition for old growth. One stand is 133 acres in the PP cover type. The Kalispell Landscape has a minor deficit of this cover type, as well as a deficit in the old growth age class. Scientific literature supports the silvicultural treatment as planned to be consistent with the restoration of PP old growth characteristics. Treatments in the other old growth stands will convert the stands to the appropriate WL/DF cover type by removing shade tolerant trees in the lower crown canopies. Stand age was the contributing factor in defining these stands as old growth during sale reconnaissance. The stands will still exhibit some old growth stand characteristics, while conditions more favorable for retaining WL in the upper canopy levels and achieving larger diameters will be provided for future stand development. (pg 5 & 6, Attachment B:1)

E. WILDLIFE

Timber harvesting will reduce the hiding, thermal, and security cover for a number of wildlife species, but the exclusion of riparian areas along streams and wetlands and other deferred areas in conjunction with road closures will retain adequate cover to avoid significant impacts. Feeding habitat would be reduced for the pileated woodpecker, due to the reduction of feeding substrate with the removal of trees. Although the abundance of feeding substrate/ acre will be reduced it will still be provided on treated acres in the form of stumps, retained snags, and retained snag recruits. Preferred fisher habitat on state land is not well connected to other fisher habitat due to intensively managed adjacent lands, although excluding harvest from SMZs will maintain travel corridors and a portion of preferred fisher habitat within the project area. (Attachment B:3)

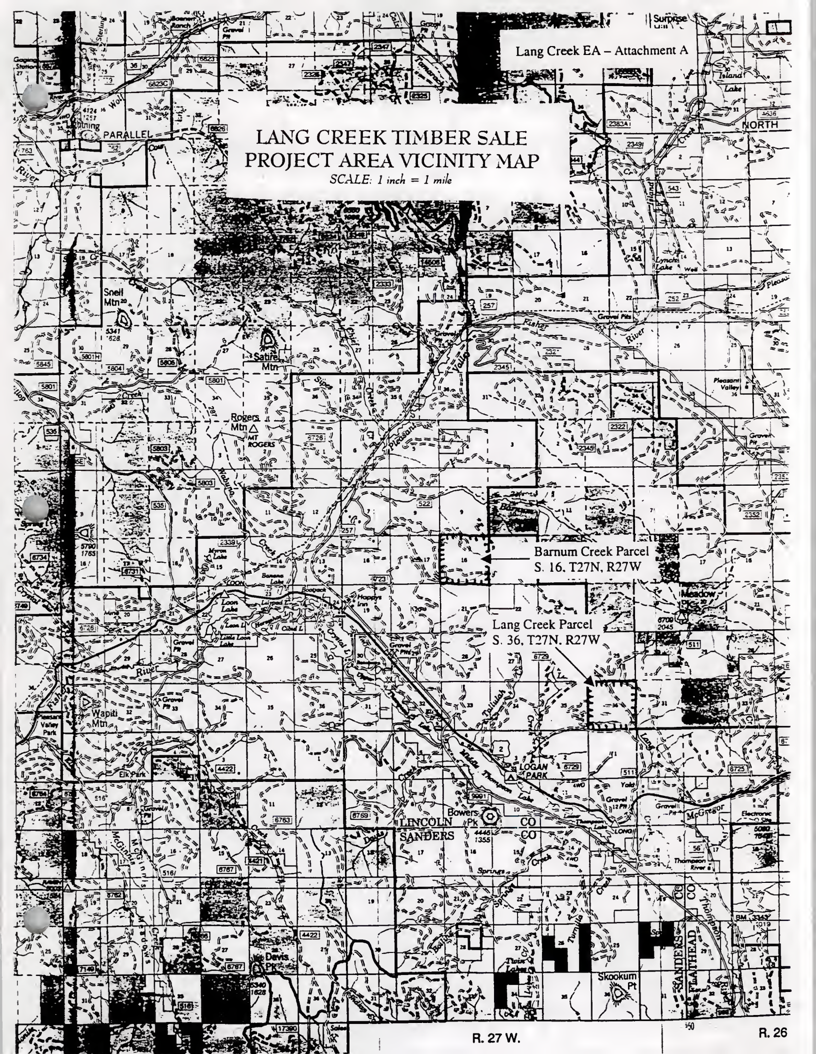
The Lang Creek Timber Sale is similar to past projects that have occurred in this area over the last 50 to 60 years. The identified impacts, taken individually or cumulatively, are within accepted threshold limits, provides for sustainable timber harvest, and complies with existing laws, policies, guidelines and standards that are applicable to the project.

27. Need for Further Environmental Analysis:

[ ] EIS [ ] More Detailed EA [X] No Further Analysis

EA Checklist Approved By:

Name: Beverly O'Brien
Title: Kal Forest Mgmt. Supv
Signature
Date: November 9, 2000



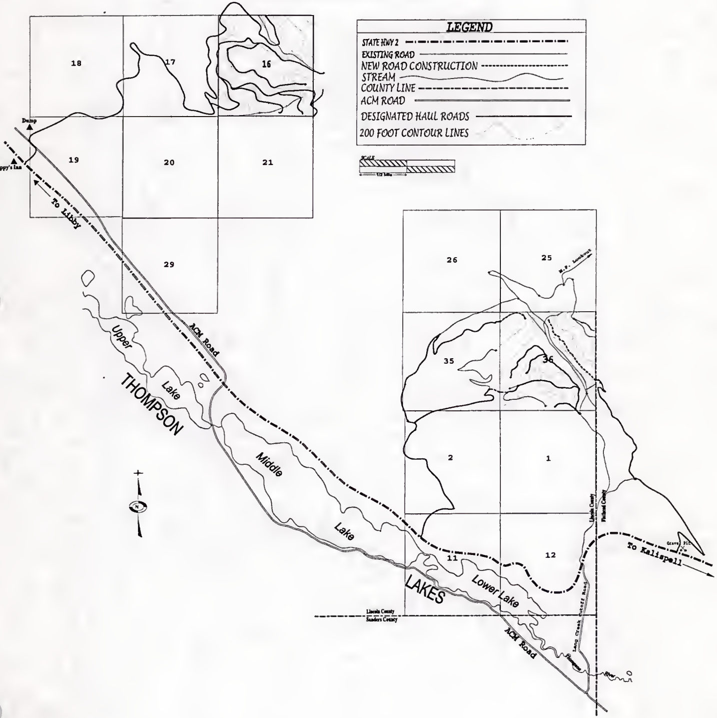
LANG CREEK TIMBER SALE
PROJECT AREA VICINITY MAP

SCALE: 1 inch = 1 mile

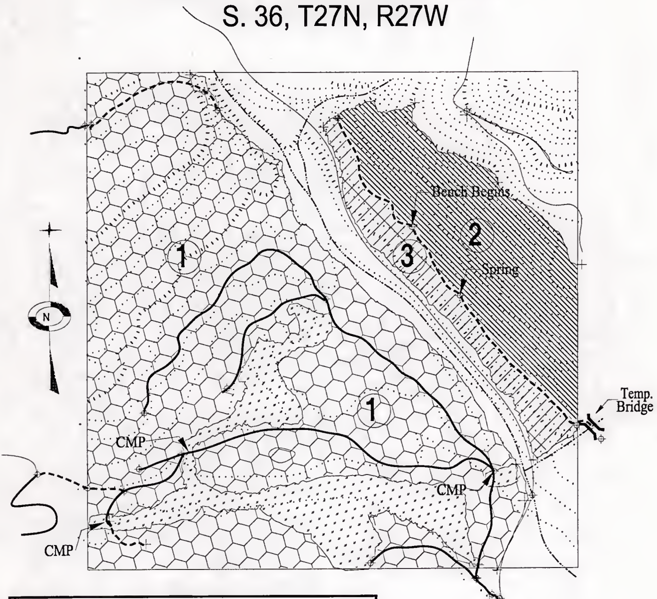
Barnum Creek Parcel
S. 16, T27N, R27W

Lang Creek Parcel
S. 36, T27N. R27W

Lang Creek Timber Sale
Haul Route Map

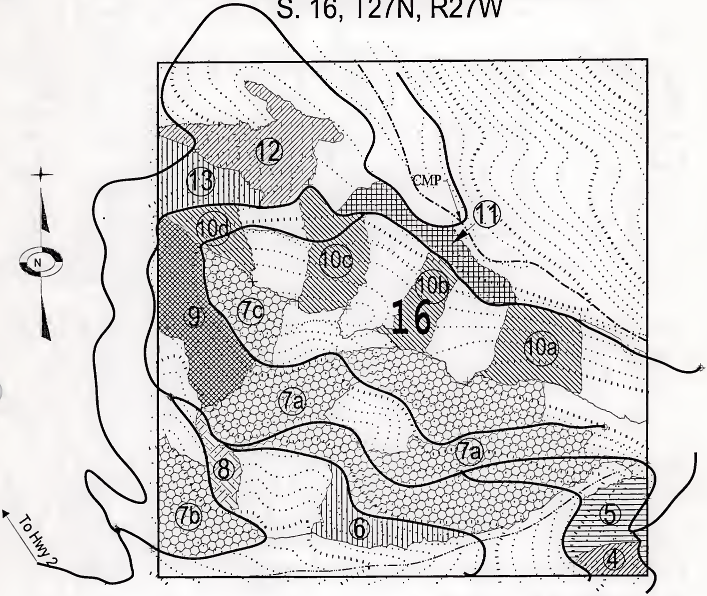


LANG CREEK TIMBER SALE
Sale Map - Lang Creek Parcel
S. 36, T27N, R27W



Harvest Unit #	Acres	Yarding Method
1	340	Ground lead
2	81	Ground lead
3	28	Skyline

LANG CREEK TIMBER SALE
Sale Map - Barnum Creek Parcel
S. 16, T27N, R27W



Harvest Unit #	Acres	Yarding Method
4	4	Skyline
5	12	Ground lead
6	11	Skyline
7a	105	Ground lead
7b	17	Ground lead
7c	12.5	Ground lead
8	5	Skyline/winchline
9	22	Skyline
10a	16	Ground lead
10b	9	Ground lead
10c	11	Ground lead
10d	8	Ground lead
11	12	Skyline/winchline
12	24	Ground lead
13	12	Skyline

LEGEND

DESIGNATED HAUL ROADS ——

HARVEST UNIT ⬡

HARVEST UNIT NUMBER ⓐ 7a

STREAM -·-·-

Countour Line (40-foot interval) ⋯

Lang Creek Timber Sale: Vegetation Existing Environment and Environmental Effects

A. Methods

Existing Forest Condition

The State Forest Land Management Plan (SFLMP) directs DNRC to promote a biologically diverse and healthy forest by implementing a 'coarse filter' approach to land management. An appropriate mix of stand structures and compositions based on historic stand conditions would be promoted on State lands. Estimates of current and appropriate cover types were determined at the landscape level for the entire Kalispell Office. The Kalispell Office used stand level inventory (SLI) data in conjunction with John Losensky's 1997 report *Historical Vegetation of Montana* to determine appropriate distribution of cover types and age classes across the landscape. Table B1:1 shows current and appropriate cover types for the Kalispell Office.

TABLE B1:1 Current and Appropriate Cover Types for the Kalispell Office

Cover Type	Current Cover Type (Acres)	Appropriate Cover Type (Acres)	Current Type Minus (-) Appropriate Type (Acres)
ALP/NC	1,778.3	233.2	1,545.1
DF	1,315.2	1,736.4	-(421.2)
LP	1,813.9	1,358.7	455.2
MC	10,803.1	2,849.6	7,953.5
PP	11,311.5	11,367.3	-(55.8)
WL/DF	22,153	31,659.7	-(9,506.7)
WWP	2,248.7	2,322.7	-(74)
OTHER	345.2	241.3	103.9
TOTAL	51,768.9	51,768.9	

ALP/NC = Alpine fir/ upper elevation non-commercial. DF = Douglas-fir. LP = Lodgepole pine. MC = Mixed conifer. PP = Ponderosa pine. WL/DF = Western larch/ Douglas-fir. WWP = Western white pine. Other = non-stocked lands, low elevation non-commercial (roads, streams, gravel pits, etc) or hardwood forests. The Current Type minus Appropriate Type column above lists the excess and deficit (-) acres for each Cover Type.

Stand level inventories were completed in the project area using measured inventory plots and professional observations. This stand level data is summarized as follows in Table B1:2 for stands to be treated within the project area:

LANG CREEK TIMBER SALE STAND TABLE –

TABLE B1:2 STANDS TO BE TREATED

STAND ID (SEC/STD#)	ACRES	STAND AGE	BA/Acre (Sq. ft)	TPA	MBF/ACRE (NET)	CURRENT TYPE	APPROPRIATE TYPE	TREATMENT
16/02	11	187	88	105	10,475	MC	WL/DF	MOD. SHWD
16/04	5	70	88	105	10,475	MC	WL/DF	MOD. SHWD
16/05	133	219	118	90	17,713	PP	PP	MOD. SHWD
16/07	12	135	57	35	6,782	PP	PP	MOD. SHWD
16/15	12	100	90	88	10,179	MC	WL/DF	MOD. SHWD
16/22	28	101	170	266	22,040	MC	MC	MOD. SHWD
16/25	48	124	90	88	10,719	WL/DF	WL/DF	MOD. SHWD
16/27	11	139	57	35	6,782	PP	PP	MOD. SHWD
16/31	12	107	88	105	10,475	WL/DF	WL/DF	MOD. SHWD
36/01	12	88	106	136	10,281	MC	WL/DF	MOD. SHWD
36/02a	81	191	106	136	10,281	DF	WL/DF	CT
36/03	17	115	106	136	10,281	DF	DF	CT
36/05	16	82	84	120	8524	DF	WL/DF	MOD. SHWD
36/06	9	88	84	120	8524	MC	WL/DF	MOD. SHWD
36/08	14	137	84	120	10,281	DF	WL/DF	MOD. SHWD
36/10	104	147	84	120	8524	DF	WL/DF	MOD. SHWD
36/11	221	114	84	120	8524	MC	WL/DF	MOD. SHWD

STAND ID = Section number/stand number; BA/Acre = Basal area per acre measured in square feet; TPA = number of merchantable trees per acre (greater than approx. 7 inches D.B.H.); MBF/ACRE = Thousand board feet per acre; CURRENT & APPROPRIATE TYPES = DF- Douglas-fir, WL/DF – Western larch/Douglas-fir; PP – Ponderosa pine; MC – Mixed conifer; TREATMENT = CT – Commercial Thin, MOD.SHWD - Modified Shelterwood

NOTE: Due to the small size of some stands and in order to facilitate obtaining more accurate inventory data, some stands were combined in the same stratum for volume calculations. Stand age, current type, and appropriate type were determined on an individual stand basis. In some cases, only portions of stands are scheduled for treatment and acres refers to only approximate acres to be treated.

By comparing current cover types to appropriate cover types (or desired future condition), it is evident that some of the appropriate western larch/Douglas-fir types and ponderosa pine types are currently typed as mixed conifer or Douglas-fir. Past timber management and fire suppression have allowed these stands to become dominated by shade tolerant species. Past logging removed many of the large, overstory western larch and ponderosa pine. Fire suppression deterred development of serals and allowed shade tolerant trees to regenerate.

B. Stand History and Development

Management activities would promote the development of historic stand conditions in the Lang Creek and Barnum Creek areas. Seral species, namely western larch and ponderosa pine, are under represented for these forest types. Past logging removed many of the largest of these trees. Fire suppression has hindered the regeneration of seral species. Management would decrease shade tolerant composition and promote seral regeneration.

Biodiversity RMS 7 in the SFLMP states, "Biological Diversity Strategies for Forest Type Groups [Remington's Study] or other current references would be used a guidance for landscape-level biodiversity evaluations, old-growth protection, and design of timber harvests to promote biodiversity. The Biological diversity strategies would be updated periodically, with professional review, as new information and concepts are developed.

In May 1998, Remington's Biodiversity Strategies was superseded by the Biodiversity Guidance as allowed for and encouraged under Biodiversity RMS 6 and 7. The Biodiversity Guidance was sent out for internal and external professional review in the summer and fall of 1997. Remington's Biodiversity Strategies is cited in the Biodiversity Guidance as being a tool to help suggest appropriate cover types for various habitat types (BIO-9); however, Remington's Study is not to be used where it is inconsistent with the Biodiversity RMS or the Biodiversity Guidance.

In particular, the Landscape Planning and Old Growth Protection portions of Remington's Study are not applicable to current management strategies since they are inconsistent with direction in biodiversity RMS 1, 3, and 6. The adoption of the Biodiversity guidance in May 1998 cleared up these inconsistencies and should be viewed as the current procedure for managing for biodiversity and old growth on State lands.

The vegetation analysis (including old growth and biodiversity) documented in this environmental analysis is in compliance with the direction specified in the Biodiversity Guidance.

Lang Creek Parcel – Existing Conditions

An inventory of this section was done in 1928 that indicated a composition of merchantable tree volume as follows:

Ponderosa Pine – 2.045 MMBF (million board feet)
Douglas-fir – 1.35 MMBF
Western Larch – 4.925 MMBF
Engleman spruce - .620 MMBF
Lodgepole Pine - .105 MMBF
Total Merchantable Volume = 9.045 MMBF in 1928

This results in a merchantable tree composition of 23% Ponderosa Pine, 15% Douglas-fir, 54% western larch, 7% Engleman Spruce, and about 1% lodgepole pine. An extensive logging operation occurred from 1949 to 1952 and harvested 9.296 MMBF from this section. Of this 9.296 MMBF, 6, 218 MBF was Douglas-fir and western larch, 1,970 MBF was ponderosa pine, 855 MBF was Engleman spruce, 81 MBF was lodgepole pine, and 172 MBF was dead standing timber. It is evident by comparing the 1928 inventory to the timber harvest numbers, that the past logging removed a very high percentage of the merchantable seral species, namely western larch and ponderosa pine. Field reconnaissance indicated that many of the dominant trees were large diameter (over 20 inches in DBH) western larch.

Current inventory data indicates a merchantable tree composition of 69% Douglas-fir, 6% western larch, 6% Engleman spruce, 4% lodgepole pine, 9% grand fir, 1% ponderosa pine, 1% mixed species (sub-alpine fir and western hemlock), and 4% dead standing trees. It is evident that a shift in species composition has occurred. The removal of overstory western larch and ponderosa pine as well as fire suppression has allowed shade tolerant species such as Douglas-fir and grand fir to increase in composition and deter the regeneration of western larch and ponderosa pine. Increased composition and densities

of shade tolerant trees has also deterred the development of large diameter trees. Current inventory information indicates an average of 3 to 4 trees per acre that are 20 inches or greater at D.B.H. (diameter at breast height). Some stand types have shifted from western larch/Douglas-fir to more shade tolerant types such as Douglas-fir and mixed conifer. Several smaller timber harvests occurred in 1973, 1976, and 1979. These harvests removed 101.5 MBF of western larch, 1,012 MBF of Douglas-fir, 22.6 MBF of ponderosa pine, 4.3 MBF of white pine, and 329.6 MBF of lodgepole pine.

Lang Creek Parcel – Environmental Effects

The majority of the area located west of Lang Creek has level to gently rolling topography. Several wet meadows and a long narrow spruce wetland are present. Disturbance regimes and intensities varied widely within this area. The historic high composition of western larch would suggest a non-lethal to mixed severity fire regime that would perpetuate a predominance of western larch in the overstory. Due to the gentle topography and easy access, this area was logged the most intense in the past. Current inventory data shows that this area is comprised of 62% Douglas-fir, 9% western larch, 7% Engleman spruce, 6% lodgepole pine, 11% grand fir, 3% dead standing trees, and 2% alpine fir and western hemlock. This area is currently typed as a mixed conifer stand type or a Douglas-fir stand type. Historically this area would have been a western larch/Douglas-fir stand type. Silviclutural prescriptions will be implemented that initiates conversion of current stand types to appropriate western larch/Douglas-fir stand types. This will be accomplished by removing shade tolerant species to provide adequate growing space for seral species. Groups and small patches of shade tolerant species will be removed as appropriate to provide for regeneration of western larch. Small patches of stagnant and low vigor trees will be removed. The main silvicultural method will be a modified shelterwood harvest that leaves groups and individual healthy trees. Western larch, ponderosa pine, and western white pine will be the favored leave trees. Vegetative communities and topography indicate that cold air readily settles in this area creating a frost pocket and should be considered for regeneration efforts. A manageable understory is present in portions of the unit. Slashing of advanced shade tolerant regeneration and subsequent planting of western larch and western white pine in some areas of the unit will be done. Seral regeneration will be encouraged and promoted by appropriate site preparation.

A broad ridge runs northeast to southwest in the northwest part of the section. This area more than likely experienced more frequent, non-lethal fire regimes. A higher occurrence of ponderosa pine would reinforce this type of fire regime. This area is currently typed as Douglas-fir but was historically a ponderosa pine type. Silvicultural prescriptions would reduce the Douglas-fir composition by thinning from below in order to improve the vigor of overstory trees so that larger size classes may be obtained. Stocking will be reduced to about 50 to 60 square feet of basal area in order to promote natural pine regeneration.

Numerous small ridges and broken topography characterize the area located east of Lang Creek. Ridge tops and drier aspects were historically ponderosa pine types that

experienced more frequent non-lethal fires. Mid slopes tended to be dominated by Douglas-fir. Lower slopes and wetter aspects had a higher composition of western larch. Currently the majority of the area east of Lang Creek is typed as Douglas-fir. Silvicultural prescriptions will promote the conversion of current Douglas-fir types to appropriate stand types. Appropriate western larch/Douglas-fir types and ponderosa pine types will be treated by reducing Douglas-fir composition. Thinning from below around dominant western larch and ponderosa pine trees will improve vigor and growth so that larger sized trees may develop. Areas that are lacking in adequate stocking of western larch and ponderosa pine will be treated by reducing basal area to approximately 50 to 60 square feet per acre. This will promote western larch and ponderosa pine regeneration. Douglas-fir will be retained throughout the area when adequate western larch and ponderosa pine are not present. Current tree composition for this area is 2% ponderosa pine, 78% Douglas-fir, 4% Engleman spruce, 11% grand fir, and 5% dead standing trees. Clumps of overstory and understory trees will be left to provide some canopy closure. Silviclutural prescriptions will retain a diversity of stand structure and densities. Small natural openings and grassy areas are scattered throughout this portion of the Lang Creek parcel.

Barnum Creek Parcel – Existing Conditions

An inventory of this section was done in 1928 that indicated a composition of merchantable tree volume as follows:

Ponderosa Pine – 1.725 MMBF (million board feet)
Douglas-fir – 1.25 MMBF
Western Larch – 2.920 MMBF
Engleman spruce - .180 MMBF
Total Merchantable Volume = 5.920 MMBF in 1928

The 1928 inventory data would yield a merchantable tree composition of 29% ponderosa pine, 19% Douglas-fir, 49% western larch, and 3% Engleman spruce. Current inventory data indicates a merchantable tree composition of 23% ponderosa pine, 54% Douglas-fir, 13% western larch, 4% Engleman spruce, 2.5 % true fir (sub-alpine and grand), and 3.5% dead standing trees. By comparing the inventory data, it is evident that western larch composition has been significantly reduced and ponderosa pine composition reduced to a lesser extent. Shade tolerant composition has increased due to past logging and fire suppression. Two major timber harvests occurred in this parcel in 1957 and in 1978-1979. The 1957 harvest removed 313 MBF of western larch, 817 MBF of Douglas-fir, and 761 MBF of ponderosa pine. The 1978-1979 harvest removed 650 MBF of western larch, 320 MBF of Douglas-fir, 810 MBF of ponderosa pine, 170 MBF of Engleman spruce, and 1,350 MBF of lodgepole pine. The most recent harvest activity occurred on the northerly aspects that contained the highest stocking of lodgepole pine. The southerly aspects were selectively thinned to improve tree growth and remove unhealthy trees.

Barnum Creek Parcel – Environmental Effects

Silvicultural methods will include thinning from below and modified shelterwood harvests to reduce shade tolerant composition and to increase growth and vigor in seral species, namely ponderosa pine and western larch. In areas where adequate ponderosa pine and western larch are present, timber harvest will focus on removing shade tolerant species. Large diameter Douglas-fir (20 inches DBH and greater) will be retained as well in order to provide canopy closure and species diversity. Approximately 50 square feet of basal area will be retained on appropriate ponderosa pine types. Denser areas will be retained in the overstory and in the understory to provide some canopy closure and structural diversity. The majority of harvest activity would occur on southerly to westerly aspects where non-lethal fire regimes would have been common and consistent with more visually open stands dominated by ponderosa pine and western larch in the overstory.

C. Old Growth

Affected Environment

The State Forest Land Management Plan (SFLMP) directs the Department of Natural Resources and Conservation to maintain a minimum of half the average proportions of old growth that would be expected to occur with natural processes on similar sites. In SFLMP, DNRC conceptually defines old growth as: Forest areas that are in the later stages of stand development. Old-growth forests are generally dominated by relatively large old trees, contain wide variation in tree sizes, exhibit some degree of multi-storied structure, have signs of decadence such as rot and spike-topped trees, and contain standing snags and large down logs. DNRC has adopted a working definition of old growth to assure that the SFLMP commitments are being met. DNRC currently defines old growth as stands that are older than 150 years of age (140 years for lodgepole pine) and that exhibit a range of structural attributes associated with old age and contain a minimum of 4 MBF per acre, net. Table B1:3 summarizes the minimum amounts of old growth retention per DNRC's commitment in the SFLMP and the current amount of old growth on the Kalispell Unit by cover type. The Kalispell Unit is currently deficit 325.81 acres in old growth per DNRC's commitment in the SFLMP.

Table B1:3 Minimum and Current Amounts of Old Growth for the Kalispell Unit

Appropriate Type	Acres	Minimum OG Retention %	Minimum OG Retention Acres	Current Amount of OG Acres	Difference in Current and Minimum OG
PP	11,367.3	30.4	3,454.75	1,484.7	-1,970.05
DF	1,736.4	6.3	109.46	365.5	+256.04
WL/DF	31,659.7	17.4	5,497.39	4,404.7	-1,092.69
LP	1,358.7	1.6	21.14		-21.14
WWP	2,322.7	11.8	274.17	451.1	+176.93
MC	2,849.6	26.7	760.62	2,530.1	+1,769.48
ALP/NC	250.8	10	25.08	580.7	+555.62
TOTAL	51,545.2	19.7	10,142.61	9,816.8	-325.81

Three stands meeting DNRC's working old growth definition are scheduled for treatment. These stands are summarized in table B1:4.

TABLE B1:4

STAND ID (Sec./Stand#)	ACRES	STAND AGE	CURRENT TYPE	APPROPRIATE TYPE
16/02	11	187	MC	WL/DF
16/05	133	219	PP	PP
36/02a	91	191	DF	WL/DF

DNRC is currently revising its old growth guidance and modifying its working definition of old growth, based on definitions developed by Green et. al. ("Old Growth Forest Types of the Northern Region," R-1 SES 4/92, USDA Forest Service, Northern Region, Missoula MT). Only Stand 16/05 (with 133 acres in ponderosa pine cover type) would meet a definition of old growth based on Green et. al. (1992). This definition is based, in part, on the presence of 8 large trees > 21 inches in diameter per acre in the stand.

Environmental Effects

Stands 16/02 and 36/02a would receive treatment that initiates conversion to appropriate stands types. This type of silvicultural treatment is consistent with the guidance set forth in the State Forest Land Management Plan. Large diameter seral trees will be retained as well as other dominant and co-dominate trees to attain desired stocking levels and structural diversity. Stand 16/05 is an old growth ponderosa pine stand. Due to past management activities and fire suppression, this stand is currently overstocked and has a significant higher Douglas-fir composition than what would have been present under natural processes. Current inventory data shows a merchantable tree composition as follows: 83% Douglas-fir, 10% ponderosa pine, and 7% western larch. Literature and research papers addressing restoration of historic ponderosa pines have consistently supported management of these stands in order to maintain and restore natural stand conditions. In order to accomplish a sustainable ponderosa pine stand, management activities would reduce Douglas-fir composition and reduce stand densities to favor seral regeneration. This silvicultural treatment is consistent with the draft management guidance for old growth currently being developed by DNRC. The stand would still meet the Green et. al. definition for old growth after harvest.

Management activities would promote the development of historic stand conditions in the Lang Creek and Barnum Creek areas. Seral species, namely western larch and ponderosa pine, are under represented for these forest types. Past logging removed many of the largest of these trees. Fire suppression has hindered the regeneration of seral species. Management would decrease shade tolerant composition and promote seral regeneration.

The SFLMP directs DNRC to maintain a sufficient amount of recruitment old growth to replace old growth stands that may lose old growth characteristics that cause these stands to no longer meet the definition of old growth. Natural disturbances such as fire, insects, and diseases as well as succession are potential causes. The Kalispell unit calculated a need for a total of 3,226.2 replacement old growth acres for all cover types. This was

calculated Weibull function for age class distribution that uses fire return interval and a shape parameter to fit the particular age class curve in a particular climatic section. The Kalispell Unit currently has 14,472.4 acres in the 100 to 149 year old age class. There is an abundance of acres in the 100 to 149 year old age class in each cover type. This project will not adversely affect the Kalispell Unit's commitment for replacement old growth stands per the SFLMP.

D. Cumulative Effects on Vegetation

Cumulative effects must address the collective impacts on the environment of the proposed action when considered in conjunction with other past and present actions that are related to the proposed action by location or generic type. Related future actions must also be considered when these actions are under concurrent consideration by any State agency. State lands within the project area are bordered by private, industrial timberlands. Kootenai National Forest lands are scattered throughout the surrounding area. Private timberlands have experienced extensive management within the past 25 years. Much of the harvest activity was regeneration cutting in the form of clearcuts or seedtree harvests. Forest Service lands have had little management activity.

Surrounding Lands

The majority of land surrounding the project area is comprised of private, industrial timberlands managed by Plum Creek Timber Company. These lands are managed intensively for wood products. Most of the logging occurred 15 to 20 years ago. Some Kootenai National Forest lands are inter-mingled. Forest Service lands have had little activity. The watershed areas for Lang Creek (4,406 acres) and Barnum Creek (9,472) were used to analysis the cumulative effects on vegetation.

If the no-action alternative were chosen, forest stands would continue to increase in shade tolerant dominated compositions. Regeneration of seral species would not be promoted in the absence of fire. Fire regimes and intensities would continue to become more severe and tend toward stand replacement. A similar situation would occur on National Forest land given the absence of fire and timber harvest. Past timber management on private lands within the project area have created younger age classes and increased the fragmentation of forest cover surrounding the project area. A no-action alternative would not add any cumulative effects to vegetation in regards to private lands surrounding the project area.

If the action alternative is chosen, it should promote the conversion of current stand types to appropriate stand types. Ponderosa pine and western larch/Douglas-fir stand types would be maintained and perpetuated. Approximately 500 acres would be converted to appropriate western larch/Douglas-fir cover types. Development of larger diameter trees would be promoted as well as regeneration of seral species. 133 acres of ponderosa pine would be treated to perpetuate historic, old growth attributes. No activity will take place in old growth western larch/Douglas-fir stands. Given the high percent of industrial private land in the surrounding area and the subsequent ongoing nature of timber harvest,

the action alternative would have very little if any cumulative effects on vegetation. No future actions are planned within the project area by the Department of Natural Resources and Conservation or any other State agency.

Lang Creek Timber Sale: Hydrology and Watershed Affected Environment

Watershed

The proposed project area lies within two watersheds, the Lang Creek watershed and the Barnum Creek watershed. Lang Creek is a 4,406 acre perennial tributary to the Thompson river. Barnum Creek is a 9,472 acre perennial tributary to the Fisher River. Precipitation in both watersheds is 20-30 inches.

- The **Barnum Creek** parcel of the proposed project area contains two perennial unnamed tributaries to Barnum Creek. Both channels are classified A-4 by Rosgen (1996). This channel type commonly has a gravel bottom, width to depth ratio less than 12, and have a channel slope greater than 4%. An A-4 channel is highly sensitive to disturbance, and has a poor capability to recover from disturbance.

- The **Lang Creek** parcel has the main stem of Lang Creek flowing through it along with two perennial tributaries to Lang Creek. Lang Creek is a C4 channel type. A C4 channel typically has a gravel bottom, width to depth ratio over 12, a broad meander pattern, and slope less than 2%. A C4 channel is very sensitive to disturbance, but recovers well if disturbed. Streamside vegetation plays a very important role in the health of a C4 channel. The unnamed tributaries to Lang Creek are A3 channels. An A3 channel has a cobble bed, slope over 4%, and a width to depth ratio less than 12.

A. Regulatory Framework

1. Surface Water Quality Standards

This portion of the Clark Fork River drainage, including Barnum Creek, Lang Creek, the Fisher River and the Thompson River and its tributaries, are classified B-1 by the Montana Surface Water Quality Standards. Waters classified B-1 by the standards must be maintained suitable for drinking, culinary and food processing purposes after conventional treatment for removal of naturally present impurities. Water Quality must be suitable for bathing, swimming, and recreation; growth and propagation of salmonid fish and associated aquatic life, waterfowl and furbearers; and agricultural and industrial water supply. Among other criteria for B-1 waters, minimal increases in turbidity, sediment, and temperature are allowed over naturally occurring levels. Naturally occurring includes conditions or materials present from runoff on developed land where all reasonable land, soil and water conservation practices (commonly called BMPs) have been applied. Reasonable practices include methods, measures, or practices that protect present and reasonably anticipated beneficial uses. These practices include, but are not limited to structural and non-structural controls and operation and maintenance procedures. Appropriate practices would be applied before, during and after all proposed management activities.

2. Streamside Management Law

Barnum Creek Parcel:

Two unnamed tributaries to Barnum Creek flow through the Barnum Creek parcel. Tributary A is a stream which flows more than 6 months of the year and does contribute surface flow to Barnum Creek. According to the Montana Streamside Management Zone (SMZ) Law, a stream that flows for more than six months of the year and contributes flow to a lake, stream or other body of water are designated as class 1. As a result, Tributary A is a class 1 stream. Tributary B is a discontinuous stream which carries flow through some reaches more than 6 months of the year. According to the Montana SMZ Law, this tributary does not fit the criteria for a class 1 or class 3 stream. As a result, tributary B is a class 2 stream. Sideslopes adjacent to the creek are less than 35%, so the required SMZ is 50 feet on each side of the creek. This 50 foot SMZ is an equipment restriction zone. Harvesting of timber is permitted within this zone, but 50% of trees or 10 trees per 100 lineal feet on each side of the creek must be retained, whichever is greater.

Lang Creek Parcel:

Lang Creek and two unnamed tributaries to Lang Creek flow through this portion of the project area. Lang Creek and each of the unnamed tributaries are all perennial streams and contribute surface flow to other bodies of water. According to the Montana Streamside Management Zone (SMZ) Law, a stream that flows for more than six months of the year and contributes flow to a lake, stream or other body of water are designated as class 1. As a result, each of these streams are class 1 streams. Lang Creek has gentle sideslopes less than 35%. The required SMZ is 50 feet on each side of the creek. The unnamed tributaries may have sideslopes steeper than 35% in places. Where sideslopes are steeper than 35% for more than 100 feet, the required SMZ width is 100 feet. These areas are equipment restriction zones. Harvesting of timber is permitted within these zones, but 50% of trees or 10 trees per 100 lineal feet on each side of the creek must be retained, whichever is greater. Where a 100 foot SMZ is required, retention trees may all be left in the interior 50 feet, but no equipment may operate within the 100 foot zone.

B. Water Quality

Timber harvesting and related activities, such as road construction, can lead to water quality impacts by increasing the production and delivery of fine sediment to streams. Construction of roads, skid trails, and landings can generate and transfer substantial amounts of sediment through the removal of vegetation and exposure of bare soil. In addition, removal of vegetation near stream channels reduces the sediment filtering capacity and may reduce channel stability and the amounts of large woody material. Large woody debris is a very important component of stream dynamics, creating natural sediment traps and energy dissipaters to reduce the velocity and erosiveness of stream flows.

1. Methods

The existing impacts to water quality in the project area were analyzed primarily through a sediment source inventory. Stream channels in the project area were examined to determine any point sources of sediment. Examples of in-channel sources of sediment would include down-cutting of the channel bed, gully formation, or streambank erosion. In addition, an inventory of the existing road system was conducted to determine both point and non-point sources of sediment. Where problems were identified, they were cataloged for repair.

2. Analysis Area

The analysis area for water quality consists of the project area and all roads outside of the proposed project area which may be used for hauling.

3. Results

Each of the creek channels in the proposed project area were assessed to determine channel stability and to look for in-channel sources of sediment. Channel stability was found to be good in most reaches of stream in the project area, and fair in unnamed tributary B to Barnum Creek. The Lang Creek parcel has two existing point sources of sediment. One of these point sources is located on the main Lang Creek road where it crosses the main stem of Lang Creek. Within the last 10 years, the culvert over Lang Creek became either plugged or overtopped during spring runoff. This created scour in the road ditch, erosion of road fill from the crossing, and sediment deposition downstream from the site. This site has been repaired, and a new culvert has been installed. The other point source is a failing log stringer bridge on the unnamed tributary in the southeast portion of the Lang Creek parcel. This bridge has no decking, several stringers are rotten, broken and falling into the creek. The abutments appear to be holding fill to date, but this is a high risk for future sediment deposition to the creek. No point sources of sediment were identified in the Barnum Creek portion of the project area.

The road system in the project area is low standard, and lacks adequate surface drainage features. It is the primary impact to water quality in the project area. The road becomes easily rutted in the spring due to water remaining on the running surface for long distances. In a few places, the road system is located near the SMZ, but for the most part, the road system only nears a creek for a crossing.

C. Cumulative Watershed Effects of Past Activities

Cumulative watershed impacts are defined as impacts to water quality that may result from the proposed action when combined with other past and present

actions. Individually, these actions may not adversely affect water quality, but present a higher risk of adverse impacts when combined. Timber harvesting and associated activities can affect the timing, distribution, and amount of water yield in a harvested watershed. Water yields increase proportionately to the percentage of canopy removal, because removal of live trees reduces the amount of water transpired, leaving more water available for soil saturation and runoff. Canopy removal also decreases interception of rain and snow and alters snowpack distribution and snowmelt, which lead to further water yield increases. Higher water yields may lead to increases in peak flows and peak-flow duration, which result in accelerated streambank erosion and sediment deposition.

1. Methods

The cumulative effects of past activities in the Lang Creek Timber Sale project area and the Barnum and Lang Creek watersheds were determined using the equivalent clearcut area (ECA) method as outlined in Forest Hydrology Part II (1976). ECA is a function of total area roaded and harvested, percent crown removal in harvest, and amount of vegetative recovery that has occurred in harvest areas. This method equates area harvested and percent crown removed with an equivalent amount of clearcut area. For example, if 100 acres had 60 percent crown removed, ECA would be approximately 60, or equivalent to a 60 acre clearcut. The relationship between crown removal and ECA is not a 1 to 1 ratio, so the percent ECA is not always the same as the percent canopy removal. As live trees are removed, the water they would have evaporated and transpired either saturates the soil, or is translated to runoff. This method also calculates the recovery of these increases as new trees vegetate the site and move toward pre-harvest water use.

In order to evaluate the potential cumulative effects of past activities effectively, a threshold of concern must be established for the Barnum Creek and Lang Creek watersheds. The stability of a stream channel is the best indicator of where a threshold of concern should be set. As water yields increase as a result of canopy removal, the amount of water flowing in a creek gradually increases. When these increases reach a certain level, the bed and banks may begin to erode. More stable streams will be able to handle larger increases in water yield before they begin to erode, while less stable streams will experience erosion at more moderate water yield increases. The channel stability of the streams in and around the project area were evaluated using qualitative assessments, as well as using procedures outlined in Forest Hydrology Part II (1976) and Rosgen (1996).

2. Analysis Area

The primary analysis area used for the cumulative effects of past activities on the watershed resource is the Barnum Creek and Lang Creek watersheds. These watersheds are approximately 9,472 acres and 4,406 acres, respectively. Both are third order streams with several intermittent first and second order tributaries.

3. Results

Channel stability in both watersheds is generally in the good range. This assessment is based on field review of the channel. There are isolated occurrences of raw, eroding banks up to 2 feet tall. Large woody material is present, as is bank vegetation. These are helping to keep the channel fairly stable. According to Rosgen (1996), A3, A4 and C4 channels are highly sensitive to disturbance. Recovery potential once disturbed is poor in A3 and A4 channel, but C4 channels have good recovery potential. According to the procedures found in Watershed RMS 7 in the State Forest Land Management Plan, a threshold of concern for water yield increase was set for the Barnum Creek and Lang Creek watersheds. Based on channel stability/sensitivity to disturbance, acceptable risk level, and the resource value at stake, the matrix shows that 14.5% is the recommended threshold of concern for the Barnum Creek and Lang Creek watersheds.

Timber harvest and associated activities have been occurring in the Barnum Creek and Lang Creek watersheds since the early 1900s, with the most recent activity beginning in the 1970s. Land currently owned by Plum Creek Timber has been managed for timber for a number of years. The project area has also been harvested as recently as 1997. These multiple entries have recovered well, and the watershed is currently fully forested. The level of harvesting does not appear to have adversely affected the channel stability in either Barnum Creek or Lang Creek.

According to calculations in the ECA model, the current annual water yield increase in the Barnum Creek watershed is 13.7% over the unharvested condition. Past harvest and road building has generated 3,151 ECA. The recommended ECA level associated with a 14.5% water yield increase threshold is 3,434. This leaves approximately 283 ECA available before the 14.5% threshold of concern is reached.

In Lang Creek, the watershed is currently 8.5% over the unharvested condition. Past harvest and road building has generated 1119 ECA. The recommended ECA level associated with a 14.5% water yield increase threshold is 1597. This leaves approximately 478 ECA available before the 14.5% threshold of concern is reached.

ENVIRONMENTAL CONSEQUENCES

Watershed

A. Water Quality

The primary effect of forest management practices on water quality is sediment delivery to streams. Sediment is generated by road construction and use, especially from roads constructed along or across streams. Timber harvest in or near riparian areas also can reduce the filtering capacity normally provided by vegetation in these areas. Limited harvesting may occur in an SMZ, but with the implementation of martin/fisher buffers in accordance with the SFLMP, the acreage would be very small. The harvest activities proposed in all timber harvest alternatives would fully comply with BMPs, the Montana SMZ Law and rules to minimize the risk of increased sedimentation from harvest units. The width and retention requirements of the SMZ Law would be exceeded through implementing the fisher/martin guidance.

1. Methods

The methodology used to determine the potential impacts to water quality of the proposed project consists of assessing changes or improvements to existing sediment sources identified through field reconnaissance, and addressing the impacts of any new activities that could potentially affect water quality.

2. Analysis Area

The analysis area for assessing the potential water quality impacts from the project proposal will be the project area, and all roads proposed for hauling, whether inside or outside of the project area.

3. Results

a. Effects of No Action

Under the No Action Alternative, no new roads would be constructed and no timber would be harvested. No new water quality impacts would be generated in the watersheds considered in the proposal beyond those already occurring due to natural processes or past management. None of the proposed stream crossing replacements or road improvements would be completed under this alternative. These problems would continue to recover or degrade as dictated by natural and preexisting conditions until funding sources become available to repair them.

b. Effects of the Action Alternative

The action alternative would harvest timber from approximately 449 acres in the Lang Creek watershed, and from approximately 280 acres in the Barnum Creek watershed. Approximately 28 acres of the Lang Creek section and about 66 acres in the Barnum Creek secion would be yarded with skyline systems. The remaining 635 acres would be yarded using ground based equipment. The ground based equipment would generate

some soil disturbance and increase the risk of erosion on skid trails. All of the trails would have applicable BMPs applied, and would minimize the risk of erosion or sediment delivery to a creek or wet area.

This alternative would bring the entire road system proposed for timber hauling up to all applicable BMPs. This would involve installation of surface drainage features and erosion control on approximately 10.6 miles of existing road accessing the Lang Creek parcel, and about 12.6 miles of existing roads into and through the Barnum Creek section. Installation of these erosion control features would disturb existing vegetation growing in the road surface, and create a short term and temporary condition of exposed soil. This bare soil would have a higher risk of detached soil and erosion, but the erosion control features would prevent this from traveling off the immediate site before being filtered out in the road side vegetation.

On the Lang Creek section, the action alternative would construct approximately 1.4 miles of new road to access stands proposed for timber harvest. Some of this road crosses a perennial creek and a spring on the hillside to the north and east of Lang Creek. The construction would occur on a rocky hillside of stable residual soil. The spring becomes subsurface before reaching the Lang Creek Road or Lang Creek. The remainder of the proposed road construction would be located well away from springs or streams. This road construction would create bare soil, and may lead to short term sediment production until bare cut and fill slopes re-vegetate. All of the new road construction would implement all applicable BMPs. There is no delivery of sediment to springs or streams anticipated as a result of any of the new road construction.

A portion of the new road construction would cross an existing perennial tributary to Lang Creek. The existing road crossed the creek with a wooden bridge which has failed and is falling into the creek. The old failing bridge would be removed, a new crossing would be installed using a temporary bridge, and the bridge would be removed following the harvest. All existing bridge abutments would be removed and slopes laid back to a stable angle. Slopes would be armored with large rock and sediment fence. The replacement of the bridge would create a short term increase in sediment to the tributary during construction. This sediment would be minimized through use of sediment fence. The replacement would create a short term increase in fine sediment, but a long term reduction by removing an existing log structure. The existing bridge would eventually collapse and the fill behind the abutments would be washed down to Lang Creek. Through the removal of this fill, there would be a net reduction in long term sediment delivery to the creek

All of the proposed projects listed above would be completed using all applicable BMPs, and would be completed in accordance with the SMZ

Law and rules. During the period of operation, and for the next 1-2 years, the risk of sediment delivery would be increased due to exposure of bare soil. This risk would be minimized through implementation mitigation measures such as sediment fences, slash filter windrows, and prompt seeding of the disturbed sites concurrent with operation. Once the sites revegetate, there would be a net improvement over the existing condition by eliminating existing sediment sources and reducing the risk of failure on several potential hazards.

B. Cumulative Watershed Effects

The cumulative effects of the proposed project are considered to determine if the activities, when combined with other past management, would put the watershed at risk. The proposed activity alone may not be detrimental to watershed health, but has the potential for adverse impacts when combined with past activity.

1. Methods

The potential watershed cumulative effects of the action alternative were determined using the equivalent clearcut area (ECA) method as outlined in Forest Hydrology Part II (1976). The assessment was made using a PC based spreadsheet program. This methodology is described in greater detail in the affected environment portion of this document.

2. Analysis Area

The primary analysis area used for the cumulative effects of past activities on the watershed resource is the Barnum Creek and Lang Creek watersheds. These watersheds are approximately 9,472 acres and 4,406 acres, respectively. Both are third order streams with several intermittent first and second order tributaries.

3. Results

a. Effects of No Action

The No Action Alternative would generate no cumulative watershed impacts beyond those under current management. Current water yield increases (WYI) and ECA levels for each watershed in the project area are listed in the affected environment portion of this document. Under this alternative, these values would remain at or near present levels and would continue to decline as past harvest units continue to regenerate and move closer to predisturbance levels of water use and snowpack distribution.

b. Effects of the Action Alternative

Lang Creek Parcel: This alternative would construct 1.4 miles of new road to access some of the proposed harvest units, and would harvest timber from 449 acres in the Lang Creek watershed. Harvest prescriptions would range from commercial thinning to a modified shelterwood. These proposed activities would generate approximately 263 ECA and would raise the water yield from its current level of 8.5% over natural to 10.5% over natural in the Lang Creek watershed. These proposed activities would not put the Lang Creek watershed over its recommended threshold of concern for water yield increases.

Table 1 -- Summary of Watershed Effects in Lang Creek

Alternative	Acres Harvested	Miles of New Road	ECA Generated	Total ECA	Allowable ECA	%WYI	Allowable %WYI
No Action	0	0	0	1119	1597	8.5%	14.5%
Action Alt.	449	1.4	263	1382	1597	10.4%	14.5%

Barnum Creek Parcel: In the Barnum Creek watershed, no new road would be constructed, and timber would be harvested from approximately 260 acres. Harvest prescriptions would range from commercial thinning to a modified shelterwood. These proposed activities would generate approximately 153 ECA and would raise the water yield from its current level of 13.7% over natural to 14.2% over natural in the Barnum Creek watershed. These proposed activities would not put the Barnum Creek watershed over its recommended threshold of concern for water yield increases. The proposed harvesting would put the Barnum Creek watershed near its threshold of concern. Adverse impacts to Barnum Creek are not expected, however due to the stability of the channels in and around the project area. The most important parameter to determine risk of in-channel erosion is channel stability. The channels in the project area are in good to fair condition and should be able to handle water yield increases near the established threshold without experiencing bed and bank erosion.

Table 2 -- Summary of Watershed Effects in Barnum Creek

Alternative	Acres Harvested	Miles of New Road	ECA Generated	Total ECA	Allowable ECA	%WYI	Allowable %WYI
No Action	0	0	0	3151	3434	13.7%	14.5%
Action Alt.	280	0	158	3309	3434	14.2%	14.5%

LANG CREEK TIMBER SALE : FISHERIES

EXISTING ENVIRONMENT

The Lang Creek and Barnum creek watersheds contain westslope cutthroat trout according to the Montana Department of Fish, Wildlife and Parks (DFWP). Spawning and rearing activity occur in these watersheds. According to the Montana River Information System (MRIS) data, bull trout do not inhabit either Barnum or Lang Creek.

The primary concern for fish habitat is clean spawning gravel. Management activities, roads, and natural events all have the potential to deliver fine sediment to spawning gravel and affect the quality of spawning sites. All tributaries in and near the proposed project area have fair to good channel stability and relatively silt-free stream bottoms. There are currently no impediments to fish spawning identified in the Barnum Creek or Lang Creek watersheds.

ENVIRONMENTAL CONSEQUENCES

Management activities, such as road construction and ground based timber harvesting, have the potential to deliver fine sediment to streams if proper best management practices (BMPs) are not applied. There is also a risk of increased fine sediment if water yield increases over thresholds of concern are reached through timber harvesting (water yield increases are explained further in the watershed assessment).

- **No Action Alternative:** Under this alternative, no timber harvesting would take place within the proposed project area. Road reconstruction, BMP improvements to existing roads, and repair of existing sediment sources would not occur under this project. These sites would remain in their current condition and continue to recover or degrade as dictated by natural and pre-existing conditions. Delivery of fine sediment to Barnum and Lang Creeks would continue at or near present levels. As a result, this alternative would have no change to the current status of fish habitat.

  Cumulative Effects: There would be no change in cumulative effects to fish habitat under this alternative. The cumulative effects of existing sediment sources would remain at their current level.

- **Action Alternative:** The action alternative would propose to harvest timber from 729 acres in the proposed project area. The watershed analysis explains the potential risks to water quality resulting from sedimentation and water yield increases. Since the watershed would not surpass any established threshold of concern for water yield increases, and all applicable BMPs would be applied to new and existing roads, there would be no negative impacts to fish spawning habitat. Repair and improvement of the existing road system, and the rehabilitation of the failing bridge in the Lang Creek watershed may generate short term risk of sediment delivery through exposure of bare soil, but this risk would be short term. This may in turn create a higher risk of damage to spawning habitat. The result of these activities would be a long term

benefit to fish spawning habitat by eliminating a long term chronic source of sediment.

Cumulative Effects: Since the watershed would not surpass any established threshold of concern for water yield increases, and all applicable BMPs would be applied to new and existing roads, there would be no cumulative negative impacts to fish spawning habitat. The result of the bridge replacement activities would be a long term benefit to fish spawning habitat, by eliminating a long term chronic source of sediment.

LANG CREEK EA: SOILS
EXISTING ENVIRONMENT

See attached table for descriptions of soil types in project area and attached map.

Portions of the proposed project area have been managed for timber in the past. Some of these managed acres were harvested using ground based equipment. Use of ground based equipment can create loss of site productivity if equipment is operated on wet soils. Soils which are not frozen, snow covered or below 20% moisture content are far more susceptible to compaction and displacement of fertile layers of topsoil. Once gravelly subsoils are exposed, ability to grow trees can be sharply reduced. Skid trail spacing is also a concern. If trails are not spaced widely enough, far more soil can be taken out of productivity due to displacement and/or compaction.

Skid trail layout in the old harvest units appears to be well spaced, and impacts are limited in their extent. Harvest units are regenerating well, and most skid trails have brush and forbs growing in them. The Lang Creek section has isolated areas where skid trails were excavated into the hillside. These trails are also stable and not causing further erosion problems on the surrounding soils.

ENVIRONMENTAL CONSEQUENCES

Cumulative impacts to soil productivity are the primary concern with the proposed project. Where areas have been managed in the past, and are proposed for re-entry, the risk of cumulative soil impacts is increased. Areas not previously managed also must take season of use, slope and skid trail spacing into account to prevent adverse impacts to soil productivity.

- **No Action Alternative:** This alternative would not harvest any timber within the proposed project area. No soils impacts or risk of cumulative soil impacts would be generated under this alternative. Decreases in soil productivity from past activity would remain at or near present levels and would not be affected by this alternative.

  Cumulative Effects: No risks of cumulative impacts to soil productivity would be generated under this alternative.

- **Action Alternative:** The action alternative would manage approximately 635 acres of timber using ground based machinery. This activity would generate disturbance to the soils within the proposed harvest units. Where proposed harvest units have been managed in the past, existing skid trails would be used where possible to minimize the risk of cumulative impacts to soil productivity. In some places, additional skid trails or alternate trail locations may be necessary. All proposed activity would leave less than 15% of the proposed harvest units in a disturbed condition. In addition, ground based machinery would not be operated unless the soil moisture is less than 20% by weight, frozen to a 4 inch depth, or covered with 9" of compacted snow or 16" of loose snow. If these recommendations are followed, adverse impacts to soil

productivity should be minimized. The remaining 94 acres of proposed harvest would use a cable yarding system. This yarding method would not produce adverse impacts to soil productivity.

Cumulative Effects: There would be no adverse cumulative effects to soils conditions from the action alternative. Where proposed harvest units have been managed in the past, existing skid trails would be used where possible to minimize the risk of cumulative impacts to soil productivity. In some places, additional skid trails or alternate trail locations may be necessary, however, all proposed activity would leave less than 15% of the proposed harvest units in a disturbed condition. The use of a cable yarding system would not have adverse effects on soil productivity.

Lang Creek Timber Sale Soil Types

Soil Description					Management Implications			
Map Unit	**Land Type**	**Geology**	**Subsoils**	**Surface Soils**	**Season of Use**	**Timber**	**Roads**	**Comments**
105	Floodplains and wet mountain meadows Elev: 2000 to 4500 ft Slope: 0-10%	Stratified alluvial deposits	Pale brown, very gravelly sandy loam	Dark, yellowish brown silt loam 4 – 6 inches	Very Limited	Potential prod: Poor Equip: very limited Regen: limited by wet soils, frost pockets, competition	Low soil strength High water table limits excavation. Flooding may erode fills, bridges.	Areas are largely void of commercial sized trees. These landtypes will be deferred from management activities. Wet soils limit season of use.
323	Rolling foothills, and drumlins. Elev: 2500 to 4500 ft. Slope: 15-60%	Soils formed in calcareous glacial till.	Gravelly silt loam to silty clay loam: calcareous	Gravelly silt loam	Limited	Potential prod: Moderate Equip: limited Regen: limited on south aspects	Poor on steep slopes, dusty in the summer and easily rutted when wet.	Operations must occur on dry or frozen or snow covered ground. Increase site productivity by leaving slash and woody debris.
324	Low relief, rolling hills Elev: 2500 to 4000 ft. Slope: 15-35%	Soils formed in calcareous glacial till. Some areas of glacial outwash.	Very gravelly silt loam.	Pale brown gravelly silt loam	Average	Potential prod: Moderate Equip: Tractor operation Regen: Moderate, can be limited by moisture stress and solar insolation.	Soil well suited for road construction. Exposed material can be difficult to regenerate	Exposed soil must be re-vegetated as soon as possible. Logging slash and woody debris helps maintain soil productivity and increase regeneration success.
328	Contains rounded, rolling, mid-elevation ridges and valleys Elev: 3000 to 4500 ft. Slope: 15-35%	Soils formed in volcanic ash-influenced loess deposits overlying dense calcareous glacial till > 5 feet	Very gravelly silt loam formed in dense glacial till	Silt loam surface 7 – 14 inches formed in volcanic ash-influenced loess.	Average	Potential prod: moderate - high Equip: Tractor operation Regen: few limitations, can be limited by brush competition	Well suited to road construction.	Limit tractor operations to dry, frozen, or snow covered soil conditions to limit compaction and surface erosion.
329	Contains rolling, convex ridges. Elev: 3000 to 5000 ft Slope: 15-35%	Soils formed in volcanic ash-influenced loess deposits overlying calcareous glacial till.	Very gravelly silt loam formed in calcareous glacial till	Silt loam, 7-12 inches formed in volcanic ash-influenced loess.	Average	Potential prod: moderate Equip: Tractor operation Regen: few limitations, can be limited by brush competition	Well suited to road construction. Limited by potential for non-rippable bedrock.	Limit tractor operations to dry, frozen, or snow covered soil conditions to limit compaction and surface erosion.

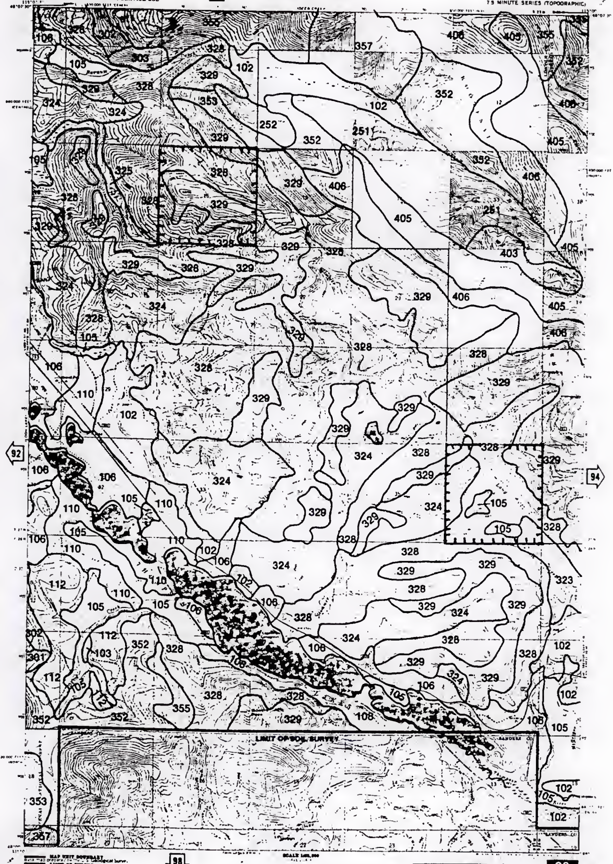
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

76

KOOTENAI NATIONAL FOREST
SOIL SURVEY 1984

THOMPSON LAKES QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)

This map is one of a set compiled in 1984 as part of a soil survey by the United States Department of Agriculture, Forest Service and other Cooperating Agencies.



92

94

MAP UNIT BOUNDARY

Base map prepared by the U.S. Geological Survey

LIMIT OF SURVEY

555 MAP UNIT SYMBOLS

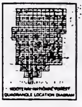
114 ADJOINING SHEET NUMBER

10 WATER

98

SCALE 1:24,000

CONTOUR INTERVAL 40 FEET
DOTTED LINES REPRESENT 20-FOOT CONTOURS
NATIONAL GEODETIC VERTICAL DATUM OF 1929


KOOTENAI NATIONAL FOREST
QUADRANGLE LOCATION DIAGRAM

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THOMPSON LAKES MONT

PHOTOREVISED 1981

Lang Creek Timber Sale – Wildlife Assessment

AFFECTED ENVIRONMENT

COARSE FILTER

The Department of Natural Resources and Conservation (DNRC) attempts to promote biodiversity by taking a coarse filter approach thereby favoring an appropriate mix of stand structures and compositions on state lands (DNRC 1996). Appropriate stand structures are based on ecological characteristics (e.g., land type, habitat type, disturbance regime, unique characteristics). A coarse filter approach "assumes that if landscape patterns and process (similar to those species evolved with) are maintained, then the full compliment of species will persist and biodiversity will be maintained" (Jensen and Everett, 1993).

Cumulative Effects

Aerial photos and field observations of the surrounding area indicate private timber property adjacent to both the Barnum and Lang Creek state sections have been significantly affected by timber harvest in recent decades. The Lang Creek section, and to a lesser degree the Barnum Creek section, contain relatively dense, mature forest stands with a mix of conifer species. The older, more dense forest stands of these state sections contain habitat qualities such as abundant tree foliage providing "snow intercept" for white-tailed deer winter range, and decaying Douglas-fir, Engelmann spruce, grand fir, and other tree species providing abundant foraging opportunities for pileated woodpeckers.

FINE FILTER

DNRC cannot assure that the coarse filter approach will adequately address the full range of biodiversity, and therefore DNRC also employs a 'fine filter' approach for threatened, endangered, and sensitive species. The fine filter approach focuses on a single species' habitat requirements (DNRC 1996).

Threatened and endangered species:

Bald eagle:

Bald eagles are generally associated with lakes or rivers in Montana. The Thompson chain lakes are within 1-2 miles of the Barnum and Lang Creek sections, and the Thompson River is within 1-2 miles of the Lang Creek section. The nearest known active bald eagle nest is adjacent to Horseshoe and Loon Lakes (T27N R28W S23), which is 3-6 air-miles from the state sections. Dominant, canopy-emergent ponderosa pine, western larch, and Douglas-fir trees and snags are available on the proposed project area for perching or roosting during carrion-foraging or inter-watershed excursions.

Grizzly bear:

The project area is outside of the northern continental divide and Cabinet-Yaak ecosystem grizzly bear recovery areas. Presently, grizzly bears are not known to consistently inhabit the proposed project area.

Wolf:

Historically, wolves have occupied the area but at present are not known to use the area for denning or rendezvous activity. The closest consistent wolf activity in recent years has been in the Pleasant Valley, 5-10 air-miles to the north and northeast. In recent years, wolves have been removed on multiple occasions from the Pleasant Valley area due to livestock depredation. Three sub-adult wolves were removed in March of 2000 from the Little Wolf pack when it was near the Pleasant Valley area. Ten to eleven wolves remain in the Little Wolf pack at present. Wolves were sighted in 1999 in the Lang Creek drainage 3-5 air miles south of the project area (Tricia O'Connor, Plains/Thompson Falls R.D., Lolo National Forest).

Lynx:

Lynx:

The project area, including both sections, ranges from approximately 3800 to 4800 feet. Areas below 5000 feet elevation are not considered typical lynx habitat, although Lynx do use areas as low as 4000 feet in Montana and 4750 feet in Washington (Squires 2000, Koehler 1990). Surrounding ridge systems descending from 6700 foot Meadow Peak occur on both sections, thus connecting the sections to more typical elevations used by lynx. Abundant snowshoe hare use and adjacency to habitat of higher elevation increase the possibility of transient or regular lynx use on the proposed project area. Lynx denning habitat (mature spruce-fir with abundant coarse woody debris) is not abundant in the proposed project area or in the surrounding vicinity. Any lynx use would probably be transient foraging excursions from preferred habitat to the lower elevation, dissected habitat of the Upper Thompson and Fisher River drainages.

Sensitive species:

Peregrine falcon:

Although peregrine falcons have been de-listed from threatened status (Federal Register, Volume 64, Number 164), they are still taken into consideration in project analyses. Although there is no Endangered Species Act authority (except a 5 year monitoring period following de-listing), the species is regarded as sensitive and will be taken into consideration when present. There is no preferred nesting habitat (cliffs, rock outcrops) within the project area, although foraging habitat occurs on nearby lakes (Thompson chain lakes).

Fisher:

In the western United States, including northwestern Montana, fisher avoid openings and prefer mature to old forest stands containing large live trees, snags, and logs (Ruggiero et al. 1994). Presently 133 acres within the Barnum Creek section are mature (100-149 years old) Douglas-fir, mixed conifer, or western larch/Douglas-fir cover types, and 67 acres are old (over 150 years old) subalpine fir or mixed conifer cover types. These are the appropriate cover types (shade tolerant, moist cover types) to be considered preferred fisher habitat. The more open 187 acres of mature and old ponderosa pine cover type on the Barnum Creek section is not an appropriate cover type to be considered preferred fisher habitat. The Lang Creek section contains 394 acres of mature mixed conifer or Douglas-fir cover types, and 155 acres of mature Douglas-fir cover type. These 549 acres of mature, relatively moist cover types could also be considered fisher habitat. Fisher use forested riparian areas for travel corridors and to a lesser degree for resting habitat (Jones 1991). On the Barnum section, 7 acres of mature mixed conifer and western larch/Douglas-fir cover types, and 23 acres of old sub-alpine fir and ponderosa pine cover types are within Streamside Management Zones. Streamside Management Zones are areas within 50 feet or more of perennial or intermittent streams. The Lang Creek section contains 34 acres of forested riparian areas within Streamside Management Zones which are mature mixed conifer and Douglas-fir cover types. Aerial photographs indicate that a majority of the surrounding forest stands on industrial private ownership have not been managed with a philosophy of retaining preferred fisher habitat.

Pileated woodpecker:

Preferred pileated woodpecker habitat consists of mature and old forest stands containing large western larch, ponderosa pine, and to some extent Douglas-fir. Pileated woodpecker nest and roost trees are generally greater than 20 inches in diameter at 4.5 feet above the ground, generally referred to as "diameter at breast height", or "DBH" (Bull 1987). Presently there is 388 and 498 acres of potential pileated woodpecker habitat on the Barnum and Lang Creek sections, respectively (Table 1). A pair of pileated woodpeckers has been observed on the Lang Creek section, and sign of feeding activity is present on both the Lang Creek and Barnum Creek sections.

Table 1. Acreage representing pileated woodpecker habitat by current cover type and stand age.

Parcel	Current cover type	Stand age (years)	Total stand area (acres)
Barnum Creek	Sub-alpine fir	> 150	55.9
Barnum Creek	Mixed Conifer	100-149	34.5
Barnum Creek	Mixed Conifer	> 150	11.2
Barnum Creek	Western Larch/Douglas-fir	100-149	85.5
Barnum Creek	Douglas-fir	100-149	13.2
Barnum Creek	Ponderosa pine	100-149	54.7
Barnum Creek	Ponderosa pine	> 150	132.8
Total acres of mature/old stands (>40% canopy closure) on Barnum Creek section			387.8
Lang Creek	Mixed conifer	100-149	239.0
Lang Creek	Douglas-fir	100-149	154.6
Lang Creek	Douglas-fir	> 150	104.3
Total acres of mature/old stands (>40% canopy closure) on Lang Creek section			497.9

Ungulate Habitat:

Moose habitat:

Moose are known to use both sections of the project area. Pellet groups, tracks, and evidence of browsing are relatively abundant, particularly on the Lang Creek section. The Lang Creek section contains wetland areas with willow (*Salix* spp.), hawthorne (*Crataegus douglasii*), and red-osier dogwood (*Cornus stolonifera*). Available winter foraging habitat containing yew trees (*Taxus brevifolia*) is present along the perennial and intermittent stream courses on the Lang Creek section. Both sections contain red-osier dogwood in the riparian areas.

White-tailed deer winter range:

Field observations indicate moderate to high white-tailed deer winter use of the lower elevation portion of the Lang Creek section, and moderate winter use of the Barnum Creek section. Montana Department of Fish, Wildlife, and Parks has designated the lower elevation portion (approximately the southern 1/3) of the Lang Creek section as white-tailed deer winter range. Stands 10 and 11 in the Lang Creek section contain all of the designated and effective white-tailed deer winter range in the proposed project area (Table 3). Canopy closure of 70% or greater is one of the criteria used to distinguish effective white-tailed deer winter range in the State Forest Land Management Plan implementation guidance (DNRC 1996b). The Barnum Creek section has no designated white-tailed deer winter range, although white-tailed deer have been observed in the late fall and early winter on the southern exposures.

Other species of interest:

Snowshoe hare:

Although the Lang Creek section (T27N R27W S36) of the project area ranges from 3800 to 4800 feet, it contains a low elevation basin with subalpine-fir, Engelmann spruce, and lodgepole pine. This area is relatively cool and moist providing snowshoe hare habitat characteristic of higher elevations. Winter field observations show moderate to high snowshoe hare abundance in this area. The Barnum Creek section ranges from approximately 4200 to 4800 feet and generally contains mixed conifer, Douglas-fir, and ponderosa pine cover types from the mid-slope to the ridges. Winter field observations indicate the Barnum Creek section also has moderate to high snowshoe hare abundance.

Raptors:

An occupied raptor nest (species unknown) was observed in the early 1980's in the Barnum Creek section. An unknown accipiter (Cooper's hawk or northern goshawk) was observed in the winter of 1999 in the Barnum Creek section. The northern goshawk, or other raptors, may inhabit the proposed project area. The

northern goshawk is known to prey on snowshoe hare an therefore may be affected by changes in snowshoe hare abundance.

ENVIRONMENTAL EFFECTS

COARSE FILTER

Cumulative Effects

Within the general vicinity of the proposed project area, the trend of recent decades would continue of decreasing acreage of densely stocked, late successional coniferous stands. A cumulative effect of the proposed project would be to move forest stand structure and composition toward a situation more similar to historic conditions. Historically stands had relatively more abundant shade-intolerant species such as western larch, ponderosa pine, and Douglas-fir in large diameter classes, and less shade-tolerant tree species. This would produce an associated decline in pileated woodpecker foraging opportunities, white-tailed deer thermal cover, and hiding cover for a variety of late-successional associated species.

FINE FILTER

Threatened and Endangered Species

Bald Eagle:

No-action Alternative

Perching and roost trees, and the current amount of vegetative screening would be retained. No effects to bald eagles would be expected to occur should this alternative be selected.

Action Alternative

The nearest known active bald eagle nest is 3-6 air-miles from the proposed project area. The accepted home range for a breeding pair of bald eagles is a radius of 2.5 miles (MBEWG 1994). A majority of the dominant, canopy-emergent ponderosa pine and Douglas-fir trees, and snags of all species, will be retained on the project area and be available as perch trees during carrion-foraging or inter-watershed excursions should they occur. The proposed project should have little to no effect to this species.

Cumulative Effects

Lower elevation bald eagle nesting and aquatic foraging habitat is several miles from the proposed project area. The effects of timber harvest activity to the uplands surrounding and within the proposed project area have been negligible to eagle nesting and aquatic foraging habitat. Therefore, no or minor cumulative effects to bald eagles and their life requirements are anticipated as a result of the proposed project.

Grizzly bear:

No-action Alternative

No increase in open road density or decrease in vegetative cover would occur under this alternative. No effects to grizzly bears would be expected to occur should this alternative be selected.

Action Alternative

A decrease in vegetative cover and therefore grizzly bear security would occur under this alternative, although retention of conifers of all age classes and eventual shrub regeneration would provide moderate security. In general, road closures and mitigation measures taken for ungulate security would also benefit

grizzly bears should they occur. The proposed project should have little to no effect on this species, which may only occur incidentally in the general area.

Cumulative Effects

Security cover would be cumulatively reduced in the general vicinity of the proposed project area. Road density within the general vicinity of the proposed project area would decrease if the proposed project is undertaken, increasing security from human-caused mortality. Should occasional grizzly bear use occur in the area, the long-term effects to the cumulative area resulting from the proposed project are expected to be minor.

Wolf:

No-action Alternative

No increase in the potential for human-caused mortality, due to increased open road density or decreased vegetative cover, would occur under this alternative. No effects to wolves would be expected to occur should this alternative be selected.

Action Alternative

A decrease in vegetative cover and therefore wolf security would occur under this alternative, although retention of conifers of all age classes and eventual shrub regeneration would provide moderate security. An active wolf den or rendezvous site would cause a temporary cessation of timber harvest during critical time periods. In general, road closures and mitigation measures taken for ungulate security would also benefit wolves should they occur. The proposed project should have little to no effect on this species.

Cumulative Effects

Security cover would be cumulatively reduced in the general vicinity of the proposed project area. Road density would decrease if the proposed project is undertaken, increasing security from human-caused mortality. Should wolf use occur in the general area, the long-term effects to the general vicinity are expected to be minor.

Lynx:

No-action Alternative

No effects to lynx would be expected to occur should this alternative be selected. No increase in the potential for human-caused mortality, due to increased open road density or decreased vegetative cover, would occur under this alternative. Low vegetation (approximately 0-5 feet, depending on snow depth) would continue to provide snowshoe hare with browse and security.

Action Alternative

In general, there is no preferred lynx denning habitat within the project area due to the low elevation. Lynx foraging habitat reflects the quality of snowshoe hare habitat. Mitigations retaining snowshoe hare use (discussed below) and reductions in road density would be beneficial to lynx foraging activity. High road densities can effect lynx through intentional and unintentional harvest, and poaching. Road density would decrease if the proposed project is undertaken, increasing security from human-caused mortality.

Cumulative Effects

The cumulative effects of the proposed project would be to temporarily reduce hiding cover for the primary prey of lynx, the snowshoe hare, although forage for snowshoe hares would increase due to disturbance from harvest. The general vicinity of the proposed project area is not typical of areas used by lynx for

denning, but may be used during foraging excursions from more typical habitat. The proposed project would cumulatively reduce security cover which may be used by lynx while moving to possible foraging areas (the proposed project area) from areas with more typical lynx denning habitat (the higher ridge systems surrounding Wolf Creek, Pleasant Valley, and the Fisher River).

Sensitive species:

Peregrine Falcon:

Common Effects to All Alternatives

No appropriate habitat exists within the project area and no effects are expected to this species under any alternative.

Cumulative Effects

No cumulative effects are expected to this species under any alternative.

Fisher:

No-action Alternative

No effects to fisher would be expected to occur should this alternative be selected. Stand conditions would generally become increasingly dense, and would remain as preferred fisher habitat.

Action Alternative

In general, the reduction in mature to old forest stands of relatively moist cover type with greater than 40 percent canopy closure (83 acres on the Barnum Creek parcel, 339 acres on the Lang Creek parcel) with a modified shelterwood treatment represents a reduction in preferred fisher habitat. Harvest activity is excluded from riparian "fisher buffer" zones on blocked state ownership, or on scattered state ownership when surrounding ownership is managed with the intent of retaining fisher habitat. The surrounding land ownership is private industrial forest land and has not been managed with this land management philosophy. Riparian areas will be protected with the appropriate Streamside Management Zones, and this will be beneficial to fisher as well as other wildlife, the majority of which use riparian areas disproportionately.

Cumulative Effects

The reduction in mature to old forest stands of relatively moist cover types represents a cumulative reduction in fisher habitat that has occurred in the general vicinity of the proposed project area in recent decades due to timber harvest. Large portions of the surrounding area may not necessarily be allowed to redevelop into preferred fisher habitat.

Pileated woodpecker:

No-action Alternative

Under the no-action alternative, pileated woodpecker habitat would not be affected. The proposed project area would provide feeding, roosting, and nesting habitat. Stand replacing wildfire and/or insect infestation could possibly reduce canopy closure in the future given the continued exclusion of lower intensity natural wildfire.

Action Alternative

Mature and old stands with greater than 40 percent canopy closure will be commercially thinned on both parcels (156 acres on the Barnum Creek parcel, 98 acres on the Lang Creek parcel). Commercially thinned stands will be well stocked with mature ponderosa pine and western larch, allowing for the retention of a majority of the present and potential roosting and nesting habitat. The release from competition may allow for increased growth rates in the retained ponderosa pine and western larch. This may also increase the closure of the mature component of the canopy. The regeneration of young conifers and retention of mature ponderosa pine and western larch would eventually allow the commercially thinned stands to become relatively dense, multi-canopied stands more typical of preferred pileated woodpecker habitat.

Mature and old stands with greater than 40 percent canopy closure harvested with the modified shelterwood treatment (83 acres on the Barnum Creek parcel, 339 acres on the Lang Creek parcel) represents a reduction in preferred pileated woodpecker habitat. Within the modified shelterwood treatments, a reduction in feeding habitat would occur with the removal of Douglas-fir, Engelmann spruce, grand fir, and a reduction in present or future nesting habitat would occur with the removal of a certain amount of closely-spaced ponderosa pine and western larch.

Table 2. Streamside Management Zones and other untreated areas representing pileated woodpecker habitat by current cover type.

Parcel	Current cover type	Stand age (years)	Unharvested areas (acres)
Barnum Creek	Sub-alpine fir	100-149	0
Barnum Creek	Sub-alpine fir	> 150	51.9
Barnum Creek	Mixed Conifer	100-149	22.5
Barnum Creek	Western Larch/Douglas-fir	100-149	17.5
Barnum Creek	Ponderosa pine	100-149	5
Barnum Creek	Ponderosa pine	> 150	7
Acres of unharvested mature/old stands (>40% canopy closure), Barnum Cr. parcel			103.9
Lang Creek	Mixed conifer	100-149	27
Lang Creek	Douglas-fir	100-149	22.1
Lang Creek	Douglas-fir	> 150	23.3
Acres of unharvested mature/old stands (>40% canopy closure) on Lang Cr. parcel			72.4

Cumulative Effects

The reduction in mature to old forest stands adds to the cumulative reduction in pileated woodpecker habitat that has occurred in the general vicinity of the proposed project area in recent decades due to timber harvest.

Ungulates:

No-action Alternative

The proposed project area would continue to progress toward mature conditions with more dense, late successional stands. Snow intercept by conifers, and thermal cover for ungulates in general, would be greater under this alternative, although browse production may be lower in the long term.

Action Alternative

Effects/mitigations common to all ungulates:

A primary concern following timber harvest activity is 1) decreased ungulate thermal cover, due to decreased canopy closure, and 2) decreased hiding cover, due to decreased low vegetation (shrubs, low tree branches, and small trees). There will be a reduction in thermal cover, which primarily provides snow intercept. White-tailed deer would be more sensitive than moose to the probable higher snow levels.

Streamside Management Zones would remain unharvested and provide a certain amount of thermal cover. Streamside Management Zones total 126 acres on both sections (42 acres on Barnum Creek parcel, 84 acres on Lang Creek parcel).

Table 3. White-tailed deer winter range on the Lang Creek section by stand number.

Stand number	Stand acres	Canopy closure	Approximate percentage of stand designated as winter range	Proposed treatment	Approximate acres of winter range affected
9	9.2	>70%	100	none	0
10	103.8	>70%	50	modified shelterwood	52
11	239	>70%	75	modified shelterwood	165
12	6.7	0	100	none	0
13	23	40-70%	100	none	0

Elk, deer, and moose security cover would be maintained to the extent possible. This primarily pertains to security from human disturbance by activities including hunting, firewood gathering, and general ATV or vehicle disturbance. This would be accomplished by:

- Effective closures of several roads in project area, leaving lower open road density than existed prior to the proposed project. Specifically 8.5 miles of secondary road would be closed (5.5 miles on the Barnum Creek parcel, 3 miles on the Lang Creek parcel). This would leave 2 miles of open road on the Barnum Creek parcel and 1.5 miles on the Lang Creek parcel. The Lang Creek parcel would have 1.3 miles of new road built during the proposed project although this newly constructed road would be reclaimed on completion of the proposed project.

- Emulation of natural processes including retention of "unburned islands", i.e., leaving well placed pockets of Douglas-fir regeneration providing visual obstruction from open and closed road beds, and other easily accessed sites such as ridges.

Increased browse production may be a beneficial aspect of decreased coniferous canopy cover, particularly on the southern exposures.

Cumulative Effects

The reduction in canopy closure provided by mature to old forest stands adds to the cumulative reduction in thermal cover that has occurred in the general vicinity of the proposed project area in recent decades due to timber harvest. Disturbance from timber harvest in the general vicinity has also provided forage for ungulates.

Other species of interest:

Snowshoe hare:

No-action Alternative

Low vegetation (approximately 0-5 feet, depending on snow depth) would continue to provide snowshoe hare with security cover and a certain, but possibly declining, level of browse.

Action Alternative

Low vegetation (approximately 0-5 feet, depending on snow depth) which provides snowshoe hare with browse and security may be reduced for the short term (2-10 years). Pockets of unharvested areas containing low cover could retain snowshoe hare use of the area directly following disturbance. Areas set aside for white-tailed deer thermal cover and Streamside Management Zones (see Environmental Effects: Ungulates) would also contain snowshoe hare hiding cover and foraging opportunities. Eventually

snowshoe hare habitat would improve after the proposed harvest with the development of early seral coniferous stands, providing both browse and hiding cover.

Cumulative Effects

The reduction in low cover provided by existing conifers and shrubs represents a cumulative reduction in hiding cover for snowshoe hare that has occurred in the general vicinity of the proposed project area in recent decades due to timber harvest. Disturbance from timber harvest in the general vicinity has also provided abundant forage for snowshoe hare. The various successional stages that can provide abundant low cover and/or forage appear to be well represented within the Barnum and Lang Creek drainages.

Raptors:

No-action Alternative

Forest stands would continue to progress toward conditions which favor raptor species associated with more dense, late successional stands. This could include the northern saw-whet and barred owls, the northern goshawk, as well as other species. Specialist species may forage in successional stages other than those documented in certain studies as preferred, and conversely generalist species may occur in a wide range of successional stages.

Action Alternative

To the extent habitat for prey species such as red tree squirrels is reduced, raptor species associated with more dense, late successional stands would be less common on the proposed project area. To the extent habitat for prey species such as meadow voles and Columbian ground squirrels is increased, raptor species associated with more open, early successional stands would be more common on the proposed project area. Attempts would be made to avoid disturbing active nests, either spatially or by timing of harvest activity, if a nest is found.

Cumulative Effects

The cumulative effect of the proposed project would be to reduce habitat of raptor species associated with more dense, late successional stands within the general vicinity of the proposed project area. Habitat preferred by raptor species associated with more open, early successional stands would be more common within the general vicinity of the proposed project area.

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MITIGATIONS TO BE IMPLEMENTED

Recommendations were integrated into the project design to mitigate resource concerns associated with the proposed actions of this project. Mitigation measures specific to each major resource concern are addressed. Many mitigation measures were initially incorporated into the project design and subsequent recommendations by resource specialists were applied to the appropriate resource. The following mitigation measures would be applied if the action alternative were chosen.

A. Old Growth

Three stands totaling 225 acres that meet the DNRC minimum old growth definition would be treated under the action alternative.

- Two of the stands would promote conversion to appropriate western larch/Douglas-fir cover types. Composition of shade tolerant species would be reduced. Seral regeneration would be promoted as well as the development of larger diameter trees. This philosophy is consistent with the DNRC's Biodiversity guidance in the State Forestland Management Plan.
- One stand is currently and appropriately typed as a ponderosa pine stand. This stand currently has a higher shade tolerant composition than would have been present under natural processes. Scientific studies and research literature have consistently supported management of historic ponderosa pine stands in the absence of natural process to perpetuate historic stand conditions. This philosophy is consistent with the DNRC's Biodiversity guidance in the State Forestland Management Plan.

B. Pileated Woodpecker

- Retain high quality western larch, ponderosa pine, and Douglas-fir for cavity nesting.
- Promote the regeneration and development of larger diameter seral species.
- Decrease in open road densities would decrease the cutting of snags for firewood. A total of 8.7 miles of existing open roads would be closed to vehicle traffic.

C. Ungulates

- Increase ungulate security by decreasing open road densities on both parcels. A total of 8.7 miles of existing open roads would be closed to vehicle traffic.
- Retain areas of denser crown closure along riparian areas by restricting logging in SMZ's and adjacent wet areas. High quality thermal 'groups' adjacent to SMZ's and wet areas were delineated and will not be harvested.

- Emulation of natural processes should provide additional forage opportunities for ungulates.

D. Water Resource

- No operations will occur within streamside management zones (SMZ's) along any perennial steams.

- Existing roads that do not meet best management practices (BMP's) for surface drainage will be re-constructed and improved to meet BMP's.

- An existing native timber bridge located on a perennial tributary of Lang Creek has failed and is contributing sediment. This old bride will be removed and rehabilitated.

E. Soils

- In order to protect fertile soils located within the project area, the season of use will be limited to periods when soil moisture conditions are favorable to avoid compaction and displacement (soil moisture content at a 4-inch depth is less than 20% of oven dry weight, or minimum frost depth of 4 inches, or a minimum snow depth of 16 inches loose or 9 inches packed).

- Limit tractor skidding to slopes less than 45% and brush piling on slopes less than 35%.
- Maintain 10-15 tons of large woody debris 3" in diameter or greater per acre and as much fine litter (tree tops and branches) as feasible for nutrient cycling and long-term site productivity.

- The logger and sale administrator will agree to a general skidding plan prior to harvest operations in order to limit ground disturbance due to skidding operations.

F. Noxious Weeds

An Integrated Weed Management (IWM) approach will be implemented if the action alternative is chosen. The following IWM measures will reduce the possibilities of weed encroachment and spread.

- All equipment associated with road work and harvesting operations will be cleaned of plant parts, dirt, and weed seed to prevent the possibility of seed dispersal by equipment.

- All newly disturbed areas of soil associated with road work will be promptly grass seeded with a site adapted seed mix to deter the establishment of noxious weeds and to prevent erosion.

- Monitor project area and contract herbicide spraying as needed to control spot outbreaks of noxious weeds.

V. COMPARISON OF ALTERNATIVES AND ENVIRONMENTAL CONSEQUENCES

Table C:1 compares the environmental consequences of the action and no-action alternatives. Environmental consequences are listed by each major resource concern. The scientific basis for the environmental effects summarized here are discussed in more detail in Chapters 3 and 4.

TABLE C:1: SUMMARY OF EFFECTS OF THE ALTERNATIVES

PROJECT EFFECTS ESTIMATES	ALTERNATIVES	
	NO ACTION	ACTION
A. Old Growth	In the absence of natural disturbances, shade tolerant composition will increase, seral species will decline, fire regime will tend more toward stand replacement as opposed to mixed severity/non-lethal, and larger diameter trees will be unlikely to develop.	Shade tolerant composition will decrease, development of larger diameter trees is likely, regeneration of seral species is likely, and occurrence of stand replacement fires is less likely.
B. Pileated Woodpecker	No change from present. A change from a non-lethal fire regime to a stand replacement fire regime would reduce feeding and cavity nesting opportunities	Decreasing open road density would increase protection of existing snags. The regeneration and development larger diameter seral species would increase cavity nesting opportunities in the future.
C. Ungulates	Development of denser, later successional forests would increase snow intercept and thermal cover. Browse availability would decrease in the future in the absence of natural disturbances.	Thermal and hiding cover would be reduced. Riparian areas, wet areas, and adjacent dense pockets would be retained to provide a connected corridor of hiding and thermal cover. A decrease in open road densities would improve ungulate security. Browse availability would increase
D. Water Resource	No new impacts would be generated. Current open road access and existing sediment source on a perennial stream would continue.	Minor and short term impacts possible due to logging and road building operations. Long-term improvement due to controlled road access and rehabilitation of an existing sediment source on Lang Creek.

E. Soils 1. Compaction	No change in area. Current open road access allows vehicles to travel on the existing roads and navigable areas within the project area during periods when soil moisture content is high and most susceptible to compaction.	Increase in area compacted due to new road construction. Mitigations and BMP's required to minimize compaction in harvest units.
2. Displacement	No change in area. Current open road access allows vehicles to travel on the existing roads and navigable areas within the project area during periods when soil moisture content is high and most susceptible to displacement.	Potential increase on steep slopes (>35%). Mitigations and BMP's required to minimize displacement in harvest units.
3. Erosion	No change in area. Continued erosion on existing roads with steep grades and inadequate surface drainage.	Potential temporary increased risk due to new road construction. Controlled access, grass seeding, reclamation of some existing roads, and surface drainage on trails and roads will limit potential for erosion.
F. Noxious Weeds	Current open road access has introduced and spread noxious weeds (spotted knapweed) along portions of existing open roads. Continued spread and introduction of noxious weeds.	Controlled road access and implementing Integrated Weed Management (IWM) measures should limit the potential for spread of noxious weeds.